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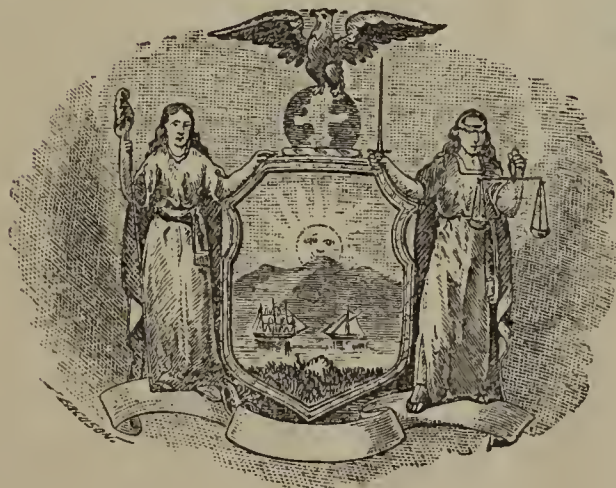
OF THE

ASSEMBLY OF THE STATE OF NEW YORK.

ONE HUNDRED AND FIFTH SESSION,

1882.

VOLUME VII.—No. 32.



ALBANY:

WEED, PARSONS AND COMPANY, LEGISLATIVE PRINTERS.

1884.

REPORT

OF THE

STATE GEOLOGIST,

GIVING AN ACCOUNT OF THE

CONDITION OF THE WORK UPON WHICH HE IS ENGAGED.

TRANSMITTED TO THE LEGISLATURE FEBRUARY 27, 1882.

ALBANY:

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STATE OF NEW YORK.

No. 32.

IN ASSEMBLY,

FEBRUARY 27, 1882.

REPORT

OF THE STATE GEOLOGIST.

To the Honorable the Legislature of the State of New York :

In accordance with the requirements of the law,* I herewith submit the following report upon the present condition of the work for the State on which I am now engaged.

The principal work with which the State Geologist is now occupied, is that upon the Palæontology of the State, which requires the collection of fossils in the field, the determination of their relations to the rock formations, their geographical and geological distribution, and the relation and order of the several rock formations in which these fossils occur. This work requires extensive field explorations and careful collection from each one of the rock formations, as well as from all the subordinate beds of the geological series. For the accomplishment of this work the State has in past years, from 1857 to 1866, made suitable appropriations; and large accumulations of the fossils have been the result.

These collections have been carefully studied, the genera and species have been described and illustrated, according to the requirements of science and of the law authorizing the completion of the Natural History of the State. The results of the explorations and investigations have been given to the public from time to time, in successive volumes, which form a part of the series of publications on the Natural History of the State.

* " And it shall be the duty of the said State Geologist to communicate to the Legislature on or before the first day of March in each and every year, a report upon the condition of any work for the State on which he may be engaged." Chapter 250 of the Laws of 1881.

During the time this work has been in progress, no annual reports have been required of the State Geologist; and the long interval which has necessarily elapsed between the publication of these larger volumes has left the Legislature and the people of the State but partially informed regarding the condition and progress of the work. It would have been greatly to the advantage of all, if annual reports had been required, as by this means a much better knowledge of the character and scope of the work would have been given, and the public would have been early put in possession of important facts which at long intervals have appeared in the quarto volumes; and also with many results valuable to the educational and practical interests of the State.

The subject has been annually brought before the Committees of Finance and of Ways and Means, and these bodies have made inquiries into the progress and requirements of the work. The Committee on Public Education have also carefully investigated the subject, and have unanimously recommended the completion of the work according to the present plan.

Five volumes of text and plates (bound in seven volumes) have already been published.

Vol. I, containing descriptions and figures of the fossils of the Potsdam sandstone, Calciferos sandstone, Birdseye, Black River and Trenton limestones, and of the Hudson River group; or the Lower Division of the New York System. 4to, xxiii, and 338 pp. and 100 plates, with interleaved explanations.

Vol. II, containing descriptions of the fossils of the Medina sandstone, Clinton and Niagara groups; or the lower Middle Division of the New York System. 4to, viii, and 362 pp. and 104 plates, with interleaved explanations.

Vol. III, containing descriptions of the fossils of the Lower Helderberg group and Oriskany sandstone; or the upper Middle Division of the New York System. 4to. Part 1, Text xii, and 522 pp. Part 2, 141 plates, with interleaved explanations of the same.

Vol. IV, containing descriptions and figures of the Brachiopoda of the Upper Helderberg, Hamilton, Portage and Chemung groups. 4to, xi, and 428 pp. and 69 plates, with interleaved explanations of the same.

A volume entitled "ILLUSTRATIONS OF DEVONIAN FOSSILS;" Gasteropoda, Pteropoda, Cephalopoda, Crustacea and Corals of the Upper Helderberg, Hamilton, Portage and Chemung groups. 4to, 7 pp. and 126 plates, with interleaved explanations. 1876.

Vol. V, Part 2, containing descriptions of the Gasteropoda, Pteropoda and Cephalopoda of the Upper Helderberg, Hamilton and Chemung

groups, completed in 1879. 4to, Text xv, and 492 pp. and 120 plates, with interleaved explanations. Bound in two volumes.

The present condition of the unpublished portions of the work is given below :

A supplement to vol. V, Part 2, has been prepared, embracing fourteen plates, lithographed, and 3,000 copies of each printed, and four plates drawn on stone ready for printing, which, when done, will complete this part of the work.

Vol. V, Part 1, containing the Lamellibranchiata, or bivalve shells of the same groups as the preceding. For this volume there are eighty plates lithographed and 3,000 impressions of each one printed. There are ten plates of drawings ready for lithographing and 800 pages of manuscript, containing descriptions of more than 300 species, ready for the printer.

For Volume VI, the Corals and Bryozoans of the Lower Helderberg group, making twenty-two plates, are already lithographed, and 3,000 impressions of each have been printed. The manuscript containing descriptions of these species is ready for the printer. In continuation of this part of the work for the illustration of the Bryozoa of the Upper Helderberg, Hamilton and Chemung groups, ten plates have been lithographed and 3,000 copies of each printed. Six plates are drawn upon stone and ready for printing. Original drawings have been made for twenty-seven plates, and drawings for ten plates are yet to be made. The above will complete the work in this class of fossils. The manuscript containing descriptions of the species thus illustrated (more than three hundred) is nearly finished, more than 600 pages being ready for the printer at this time.

CORALS OF THE UPPER HELDERBERG, HAMILTON AND CHEMUNG GROUPS. Of this class of fossils two plates have been lithographed and 3,000 copies of each printed ; four other plates are lithographed and proved but not printed. Beyond these there are now completed figures or drawings of corals which, it is estimated, will make about eighty plates which are now ready for the lithographer.

Of the Brachiopoda, preparatory for a revision of the genera, etc., twenty-seven plates are lithographed, and 3,000 copies of each have been printed.

Of the Crustacea, including Trilobites and other forms of this class of fossils, eight plates are lithographed, and 3,000 copies of each have been printed. Fifteen plates of drawings are ready for the lithographer, and the descriptions are mainly ready for the printer.

Of the Crinoidea, two plates of drawings are ready for the lithographer.

At the present time, the work on the original drawings is pro-

gressing very favorably, and the appropriation of \$1,800 annually, which has been granted for some years past, suffices to keep this part of the work in satisfactory progress. No printing for the work has been done within the past two years, or since the completion of Vol. V, Part 2, at the close of 1879; and all work in lithography has been suspended for more than a year past.

The investigations in the preliminary work, preparatory to publication, are constantly progressing; the specimens arranged and prepared, and the drawings made to illustrate the species in the collection.

For the better understanding of the condition of the work, as briefly stated above, I have appended a synopsis, or abstract, in each of the groups of fossils in which advanced progress has been made, in the order in which they are enumerated. This, I hope, may serve to assure your honorable body that the progress stated is real and substantial.

In connection with the work pertaining to the description of the fossils, it has long since been found important to revise some of the former field observations of the survey, with a view to determining the true horizon of certain forms of fossils, and the relation of some of the beds and groups to each other. This field-work was required for preserving the scientific authority and authenticity of the publications relating to the geological history of the State. This work has been carried on in connection with, and as a necessary adjunct for the intelligent collecting of fossils for the Palæontology. Since the cessation of special appropriations for this purpose, I have considered it my duty to continue the investigation, however inadequate my means for its final completion.

The most important special question at issue, at this time, is the determination of the relations of the "CATSKILL GROUP," which name has been adopted in the geological nomenclature of the State reports. This has been described as occupying certain areas of country, and characterized by certain peculiar fossils. In the course of the field-work carried on for the Palæontology, it became evident that former determinations in regard to its geographical extent could not be relied on, and there arose a necessity for a rigid re-examination of localities, and a determination of the question before certain species of fossils could be satisfactorily assigned to their geological horizon.

The most advanced portion of the palæontological work is that upon the Lamellibranchiata, or fossil bivalve mollusca of the New York geological formations. In the lowest groups of strata fossils of this class are extremely rare; none are known in the Potsdam sandstone of the State of New York, nor in that rock in the Western States, up to the present time though in the arenaceous formations of later

periods, fossils of this class are abundant. They are rare in the calciferous sandstone (or lower Magnesian limestone), and few are known in the Birdseye limestone. In the Black River and Trenton limestone, these fossils first became conspicuous, and they occur in numerous specific forms, representing at least seventeen well-marked genera. In the Hudson River group, the number of genera is increased by at least five well-marked forms — so that to the close of the lower Silurian, or the upper limits of the Cambrian, we have at least twenty-two genera of well-marked bivalve mollusca.

The genera and species of these forms have been partially illustrated in Vol. I of the *Palæontology of New York*.

In the series including the Medina sandstone, Clinton and Niagara groups, we find a few additional well-marked generic forms. The Lower Helderberg group furnishes others, while in this and the preceding groups, the generic forms so characteristic of the lower rocks have nearly all disappeared or are but sparsely represented.

In the formations above the Lower Helderberg, to the Chemung group inclusive, we have at least seventy genera with nearly five hundred species, known in the State of New York.

While in the older groups of the series the number of species and genera correspond more nearly with similar formations in other States of our own country and with European formations of the same age, we find in the groups above the Upper Helderberg a much greater development in the number of species and of generic forms. At the same time the number of individuals is without a parallel in any known formations of Palæozoic age. This increase in the number of species and individuals is due to the constantly increasing area of littoral and off-shore deposits, which occupy a much greater area from the commencement of the Hamilton group than at any previous period in our geological history. These deposits, moreover, are of such a character as to afford a sea bottom favorable to their growth and development.

In order to give some more distinct ideas regarding this portion of the palæozoic fauna of the State, I have presented below a preliminary grouping of the genera and species, which will be more completely illustrated in the volume to which I have referred. (Vol. V.)

This preliminary sketch, accompanied by illustrations, will give a clearer view of the nature and extent of the subject than any written description alone, and the report may by this means be made acceptable and useful to every student of Geological Science.

JAMES HALL,

State Geologist.

CLASSIFICATION OF THE LAMELLIBRANCHIATA.

In the classification of the Lamellibranchiata, or the grouping together of allied forms, as in all other series of natural history objects, first under generic titles and these again under family names, the system of various authors is not uniform. The following arrangement is according to Mr. S. P. Woodward, who has written the most satisfactory Manual of Conchology which we have in the English language. This arrangement is adapted almost wholly to the living representatives of the class. Numerous palæozoic genera, many of which were constituted at a period subsequent to this publication, are not included in his system. I have, therefore, thought it better to present this in its original form, to be followed by another table with some modifications in which the American palæozoic genera are introduced according to their apparent relations.

RELATIVE IMPORTANCE OF THE CHARACTERS OF THE LAMELLIBRANCHIATA (AFTER WOODWARD).

1. Extent to which the mantle-lobes are united.
2. Number and position of muscular impressions.
3. Presence or absence of a pallial sinus.
4. Form of the foot.
5. Structure of the branchiæ.
6. Microscopic structure of the shell.
7. Position of the ligament, internal or external.
8. Dentition of the hinge.
9. Equality or inequality of the valves.
10. Regularity or irregularity of form.
11. Habit — free, burrowing or fixed.
12. Medium of respiration, fresh or salt water.

Lamellibranchiata.

(Classification as given by Woodward.)

Asiphonida.

Ostreidæ, *Ostrea*, *Pecten* *Lina*.

Aviculidæ, *Aviculopecten* *Pinna*.

Mytilidæ, *Mytilus*, *Myalina*, *Modiola*.

Arcidæ, *Nucula*, *Leda*, *Solenomya*.

Trigoniadæ, *Lyrodesma*.

Unionidæ.

Siphonida ; integropallialia.

Chamidæ.
Hippuritidæ.
Tridacnidæ.
Cardiadæ, *Conocardium*.

Lucinidæ, *Lacina*.
Cycladidæ.
Cyprinidæ, *Pleurophorus*, *Wegaleden*.

Siphonida ; Sinupallialia.

Veneridæ.
Mactridæ.
Tellinidæ, *Sanguinolaria*.
Solenidæ, *Solen*.

Myacidæ.
Anatinidæ, *Cardiomorpha*, *Edmondia*.
Gastrochænidæ.
Pholadidæ.

PRELIMINARY CLASSIFICATION OF THE PRINCIPAL AMERICAN DEVONIAN GENERA; INCLUDING A FEW SILURIAN FORMS.

FAMILY I — *Pectenidæ*.

Pernopecten.	Crenipecten.
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FAMILY II — *Avipectenidæ*.

Aviculopecten.	Pterinopecten.
Lyriopecten.	

FAMILY III — *Pteriniidæ*.

Pterina.	Actinopteria.
S. G. Vertumnia.	Ptychopteria.

FAMILY IV — *Aviculidæ*.

Avicula.	Pteronites.
Limoptera.	Pteronitella.
Glyptodesma.*	Palæopinna.
Leiopteria.	Ectenodesma.
Leptodesma.	Pseudomonotis.

FAMILY V — *Mytilidæ Ambonychidæ*.

Modiola, S. G. Mytilops.	Gosselettia.
Mytilarca, S. G. Plethomytilus.	Byssopteria.
Mytilarca.	Megambonia.
Ambonychia.	

FAMILY VI — *Modiomorphidæ*.

Modiomorpha.	Sanguinolites.
Cypricardella.†	Cypricardinia.
Goniophora.	

FAMILY VII — *Nuculidæ*.

Nucula.	Leda.
Nuculites.	Palæoneilo.
Pyrenomoeus.	Tellinomya.
Yoldia.	

FAMILY VIII — *Arcidæ*.

Macrodon.	Dystactella.
Nyassa.	Megalomus.
Ptychodesma.	

FAMILY IX — *Unionidæ*.

Amnigenia.

* The species of this genus have been referred to the genus *Actinodesma* of Sandberger, but prove on examination to be very distinct.

† = *Microdon*, Conrad ; — *Microdonella*, Kayser ; = *Eodon*, Hall.

FAMILY X -- *Grammyside*.Grammysia.
Leptodomus.

Sphenomya.

FAMILY XI -- *Cardiida*.Conocardium.
Cardiola.

Lunulacardium.

FAMILY XII -- *Lucinida*.Paracyclas.
Cardiomorpha.

Edmondia.

FAMILY XIII -- *Cytherodontida*.Cytherodon.
Lyrodesma.

Tellinopsis.

FAMILY XIV -- *Tellinida*.

Tellinopsis.

FAMILY XV -- *Anatinida*.

Prothyris.

Palanatina = Illionia Bill.

FAMILY XVI -- *Pholadellida*.Orthonota.
Orthodesma.
Cimitaria.Phthonia.
Pholadella.

SYNOPSIS

OF THE CHARACTERS OF NEW GENERA WHICH HAVE BEEN PROPOSED, WITH REMARKS UPON OTHERS OF THE SAME ORDER.

For the sake of completeness and as a guide to the new genera, which have been proposed, it has seemed expedient to present a short notice of their characters with references to the accompanying plates. These plates are intended to represent the characteristic generic forms, and to convey, in a measure, some idea of the variety of forms embraced in each genus. In a primary sense, the plates are also designed as a key to the genera, and to facilitate the study of the principal characters of the monomuscular Devonian lamellibranchiata of the State of New York.*

Pernopecten, Winchell. Shell like *Pecten*. Hinge with a central cartilage pit, and a crenulated hinge-plate on each side below the hinge margin. This and the following genus appear to be more nearly related to the genus *Pecten* than to *Aviculopecten*.

EXAMPLES — *Pernopecten limiformis*. Pl. i, figs. 1, 2.
Pernopecten Shumardanus. Pl. i, fig. 3.

Crenipecten, Hall. Like *Pecten* or *Aviculopecten* in form. Hinge furnished with a series of small cartilage pits throughout its entire length.

EXAMPLES — *Crenipecten Winchelli*. Pl. i, figs. 4, 5.
Crenipecten Leon. Pl. i, fig. 6.
Crenipecten amplius. Pl. i, fig. 7.
Crenipecten crenulatus. Pl. i, figs. 8, 9.

Aviculopecten, McCoy, is emended to include those forms which have the hinge-line usually shorter than the transverse diameter, and both ears well-defined. Test ornamented with rays.

EXAMPLES — *Aviculopecten princeps*. Pl. ii, figs. 1-4.
Aviculopecten fasciculatus. Pl. ii, fig. 5.
Aviculopecten duplicatus. Pl. ii, fig. 6.
Aviculopecten rugæstriatus. Pl. ii, fig. 7.
Aviculopecten dolabriformis. Pl. ii, fig. 8.
Aviculopecten insignis. Pl. ii, fig. 9.
Aviculopecten bellus. Pl. ii, figs. 10, 11.

*The plan of this report contemplated a still farther illustration of the generic forms of American palæozoic lamellibranchiata. The manuscript and proposed illustrations, which are incomplete at the date of this publication, will probably be published in some other report or bulletin of the New York State Museum.

Lyriopecten, Hall. This genus differs from the preceding in the short hinge-line and very small anterior ear. Test usually ornamented with strong rays.

EXAMPLES — *Lyriopecten magnificus*. Pl. ii, fig. 12.
Lyriopecten interradiatus. Pl. ii, fig. 13.
Lyriopecten cymbalon. Pl. ii, fig. 14.

Pterinopecten, Hall. Hinge-line long. Ears not well-defined, being simple expansions or extensions of the upper lateral margins to the hinge-line. Test ornamented with rays.

EXAMPLES — *Pterinopecten undosus*. Pl. i, figs. 12, 13.
Pterinopecten Vertumnus. Pl. i, figs. 14, 15.
Pterinopecten erectus. Pl. i, fig. 16.

Pterinea, Goldfuss. Shell inequivalve, inequilateral; posterior side alate; anterior end nasute or auriculate. Ligament internal; ligamental area longitudinally striated. Cardinal teeth two or more. Lateral teeth linear oblique. Posterior muscular impression large, situated on the post-umbonal slope. Anterior muscular impression small, situated within the rostral cavity. Test ornamented with rays.

EXAMPLES — *Pterinea flabella*. Pl. iii, figs. 1-3.
Pterinea Chemungensis. Pl. iii, fig. 4.

s. g. *Vertumnia*, Hall. This form differs from *Pterinea* in having the right valve convex, and the left flat or concave. Hinge area narrow.

EXAMPLE — *Pterinea (Vertumnia) reversa*.

Actinopteria, Hall. Characterized as differing from *Pterinea* in the absence of a broad striated ligamental area and strong cardinal and lateral teeth. Right valve subconvex. Surface with fine rays.

EXAMPLES — *Actinopteria subdecussata*. Pl. iii, fig. 9.
Actinopteria Boydi. Pl. iii, figs. 10, 11.
Actinopteria eta. Pl. iii, figs. 12, 13.

Ptychopteria, Hall. This form differs from *Actinopteria* in the nasute anterior extremity, and large straight wing marked by a strong longitudinal fold. Hinge-line narrow, linear; furnished with one or two linear oblique cardinal and lateral teeth. Surface with fine rays.

EXAMPLES — *Ptychopteria Beecheri*. Pl. iii, figs. 15, 16.
Ptychopteria Salamanca. Pl. iii, figs. 17, 18.
Ptychopteria Proto. Pl. iii, fig. 19.

Limoptera, Hall. Shell large, inequivalve, inequilateral, subquadrate, strongly alate on the posterior side, auriculate on the anterior end. Ligamental area large, common to both valves, wider in the left valve, longitudinally striate and extending to the cardinal extremities. The hinge has an oblique posterior tooth and several cardinal folds under the beak. Anterior muscular impression very small and deep, situated at the apex of the rostral cavity; posterior impression large.

Pallial line simple, formed of a series of small, deep pits. Inter-pallial area with numerous small pits for the attachment of umbonal muscles. Test radiated ; radii becoming obsolete with age.

EXAMPLES — *Limoptera macroptera*. Pl. iii, figs. 5, 6.
Limoptera cancellata. Pl. iii, fig. 7.

Glyptodesma,* *Hall*. Shell aviculoid, erect or moderately oblique ; inequivalve. Ligament external. Ligamental area striated continuously. Hinge with two strong lateral teeth, and numerous irregular transverse plications along the cardinal margin. In form, the shells of this genus resemble *Actinodesma* ; but it has not the prominent diverging teeth of that genus. Surface marked by concentric striæ.

EXAMPLE — *Glyptodesma erectum*. Pl. iv, figs. 1, 8.

Leiopteria, *Hall*. Shell aviculoid, oblique, subrhomboidal. Anterior extremity auriculate ; wing large, extremity produced. Test without proper rays. Ligament external. Ligamental area marked by fine parallel longitudinal striæ. Hinge with one or two oblique slender lateral teeth. The cavity of the beak is partially separated from the anterior end by a short partition or diaphragm.

EXAMPLES — *Leiopteria Rafinesquii*. Pl. iv, figs. 9, 10.
Leiopteria Dekayi. Pl. iv, fig. 11.

Leptodesma, *Hall*. This genus in its prevailing form is similar to *Leiopteria*, except that the anterior end is always nasute and acute instead of auriculate and rounded. Hinge narrow, furnished with a slender lateral tooth just posterior to the beak and nearly parallel to the hinge-line. Ligament external. Ligamental area narrow, extending the entire length of the hinge, marked by fine, sharp, longitudinal striæ. Test with concentric striæ.

EXAMPLES — *Leptodesma longispinum*. Pl. iv, fig. 12.
Leptodesma Hector. Pl. iv, figs. 13, 14.
Leptodesma flaccidum. Pl. iv, fig. 15.
Leptodesma propinquum. Pl. iv, fig. 16.

Pteronites, *McCoy*. This genus is restricted to those possessing the characters of the original types. Body very oblique. Hinge-line longer than the body of the shell. Wing and hinge extended posteriorly. Test marked by concentric striæ.

EXAMPLE — *Pteronites profundus*. Pl. iv, fig. 17.

Palæopinna, *Hall*. Shell similar in outline to some forms of *Pinna*, gaping in front. Test marked by fine radiating lines. Body convex and test with fine rays. Hinge-line simple.

EXAMPLE — *Palæopinna flabella*. Pl. v, fig. 14.

Ectenodesma, *Hall*. This form resembles *Glyptodesma* in outline, except that the anterior wing is more produced and both wings more acute at their extremities. Test ornamented with rays.

EXAMPLE — *Ectenodesma birostratum*. Pl. iii, fig. 8 ; Pl. iv, fig. 18.

* Heretofore erroneously referred to *Actinodesma*, Sandberger.

Byssopteria. Shell erect, equivalve. Alate posteriorly, truncate, and with a nasute projection in front. Surface radiated.

EXAMPLE — *Byssopteria radiata*. Pl. v, fig. 13.

Mytilarca, s. g. *Plethomytilus*, Hall. Equivalve, mytiloid, gibbous. Shells with a finely striated ligamental area. Posterior side subalate. Hinge-line transverse. Lateral teeth small, oblique; cardinal teeth have not been observed, but probably existing. Test with concentric striæ.

EXAMPLES -- *Mytilarca (Plethomytilus) ponderosa*. Pl. v, figs. 1, 2.
Mytilarca (Plethomytilus) oviformis. Pl. v, fig. 4.

Mytilarca, Hall. Shell equivalve, inequilateral and mytiliform with terminal beaks and short hinge-line, which is bordered by a flattened, longitudinally striated, ligamental area of greater or less extent. Cardinal teeth small, situated beneath the beak. Posterior teeth small and oblique, situated at the post-cardinal extremity of the hinge. Test free from radii, with a single known exception.

EXAMPLES — *Mytilarca lata*. Pl. v, fig. 3.
Mytilarca Chemungensis. Pl. v, figs. 5, 6.
Mytilarca carinata. Pl. v, figs. 7, 8.

Gosselettia, Barrois. Shell subtriangular, truncate on the anterior side, subalate on the posterior side. Ligamental area wide, longitudinally striate. Cardinal teeth strong, situated under the beak. Lateral teeth elongate. Surface marked by concentric striæ.

EXAMPLE — *Gosselettia triquetra*. Pl. v, figs. 9, 10.

Modiola, s. g. *Mytilops*, Hall. The fossils of this genus resemble *Modiola* and *Lithodomus* in external form, and may also be compared with the fossil genus *Myoconcha*. Hinge-line narrow, oblique, extending about one-half the length of the shell. Beaks terminal.

EXAMPLE — *Modiola (Mytilops) præcedens*. Pl. v, figs. 11, 12.

PLATE I.

PERNOPECTEN LIMIFORMIS.

- Fig. 1. A view of the type specimen of the species and of the genus.
Fig. 2. An enlargement of the cardinal portion of the preceding, as obtained from a gutta-percha impression, showing the characters of the hinge. Burlington sandstone. *Burlington, Iowa.*

PERNOPECTEN SHUMARDANUS.

- Fig. 3. An enlargement of the cardinal portion of one of the type specimens of this species, showing the characters of the hinge. Waverly group. *Newark, Ohio.*

CRENIPECTEN WINCHELLI.

- Fig. 4. A left valve showing the form and ornamentation of the shell.
Fig. 5. The upper portion of a left valve enlarged to two diameters, showing the form and surface characters of the ears, and the transverse ligamental grooves or cartilage pits. Waverly group. *Newark, Ohio.*

CRENIPECTEN LEON.

- Fig. 6. The left valve described showing the hinge characters and form of the valve. Chemung group. *Leon, Cattaraugus Co., N. Y.*

CRENIPECTEN AMPLUS.

- Fig. 7. A left valve showing the cartilage pits along the hinge. Chemung group. *Rockville, Allegany Co., N. Y.*

CRENIPECTEN CRENULATUS.

- Fig. 8. The cardinal portion of a left valve enlarged to two diameters, showing the row of cartilage pits. Chemung group. *Rockville, N. Y.*
Fig. 9. A left valve of this species. Chemung group. *Philipsburg, N. Y.*

EUCHONDRIA NEGLECTUS (Geinitz sp.).

- Figs. 10, 11. A reproduction of figs. 7c and 7a of plate XXVI, Geol. Surv. Illinois, Vol. V, for comparison with *Pernopecten* and *Crenipecten*. Fig. 10, a right valve, enlarged two diameters. Fig. 11 an enlargement of the hinge. Coal measures. *Illinois.*

PTERINOPECTEN UNDOSUS.

- Fig. 12. A characteristic right valve.
Fig. 13. A left valve showing the usual form of the species. Hamilton group. *Eastern N. Y.*

PTERINOPECTEN VERTUMNUS.

- Fig. 14. A specimen preserving both valves, showing their comparative form and surface ornamentation.
Fig. 15. A large left valve. Hamilton group. *Schoharie Co., N. Y.*

PTERINOPECTEN ERECTUS.

- Fig. 16. A left valve of medium size. Chemung group. *Ithaca, N. Y.*

LAMELLIBRANCHIATA.

Report State Geologist. 1882.

Generic Illustrations.

Plate I.

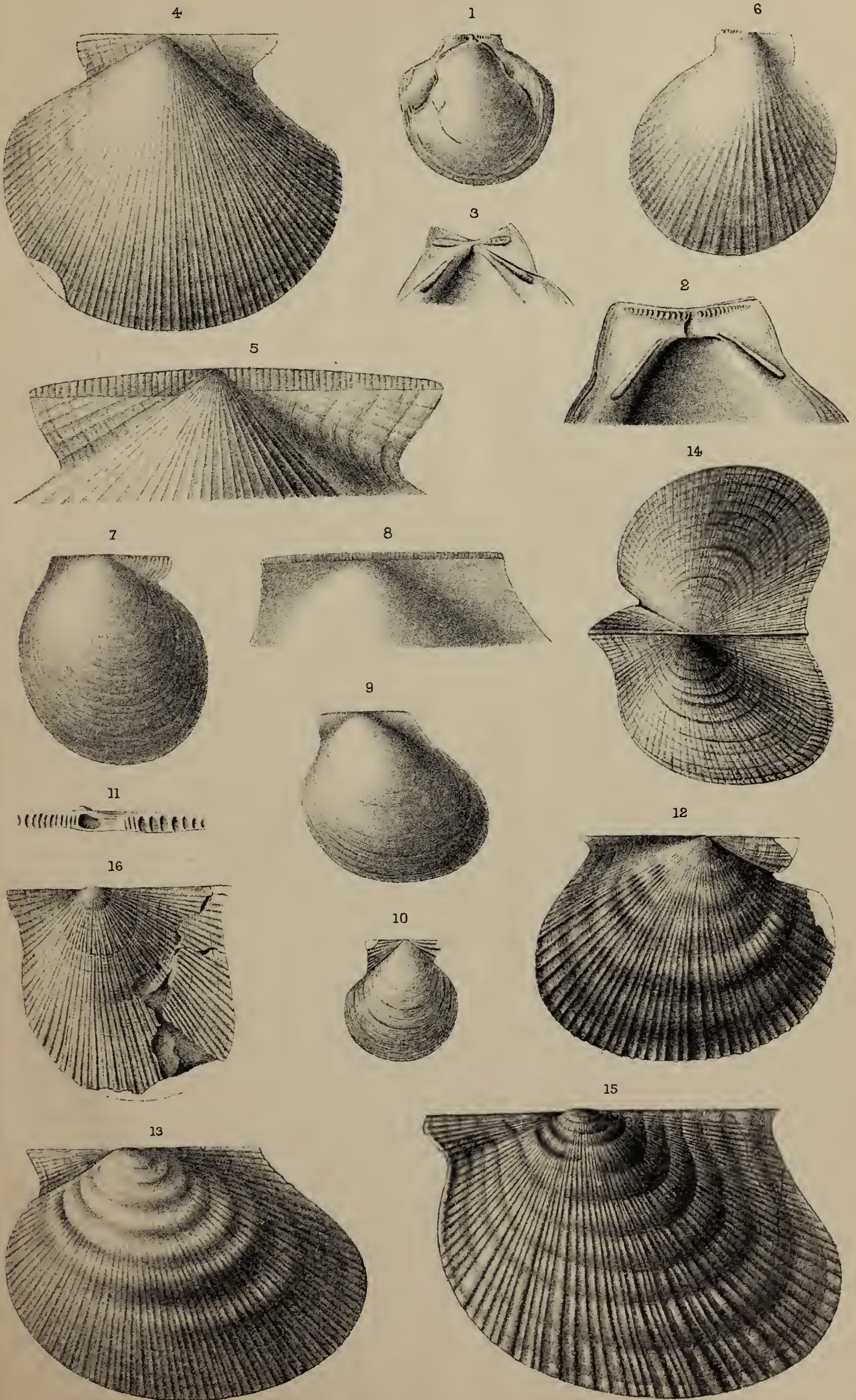


PLATE II.

AVICULOPECTEN PRINCEPS.

- Fig. 1. A large left valve much extended posteriorly. Hamilton group. *Seneca lake, N. Y.*
Fig. 2. An entire and characteristic right valve. Hamilton group. *Cazenovia, N. Y.*
Fig. 3. A right valve showing the pallial line and muscular impression. Hamilton group. *Ludlowville, N. Y.*
Fig. 4. The cardinal portion of a specimen showing the striated ligamental area. Hamilton group. *Cazenovia, N. Y.*

AVICULOPECTEN FASCICULATUS.

- Fig. 5. A left valve showing the general form of the shell. Hamilton group. *Near Clarksville, N. Y.*

AVICULOPECTEN DUPLICATUS.

- Fig. 6. An entire right valve. Chemung group. *Mansfield, Pa.*

AVICULOPECTEN RUGÆSTRIATUS.

- Fig. 7. A right valve of this species. Chemung group. *Rockville, Alleghany Co., N. Y.*

AVICULOPECTEN DOLABRIFORMIS.

- Fig. 8. A right valve enlarged to two diameters. Chemung group. *Philipsburg, N. Y.*

AVICULOPECTEN INSIGNIS.

- Fig. 9. A left valve preserving the form and proportions of the shell. Hamilton group. *Stafford, Genesee Co., N. Y.*

AVICULOPECTEN BELLUS.

- Fig. 10. A specimen preserving both valves, showing their comparative form and relations, x 2. Hamilton group. *Near Bellona, N. Y.*
Fig. 11. A right valve, x 2.

LYRIOPECTEN MAGNIFICUS.

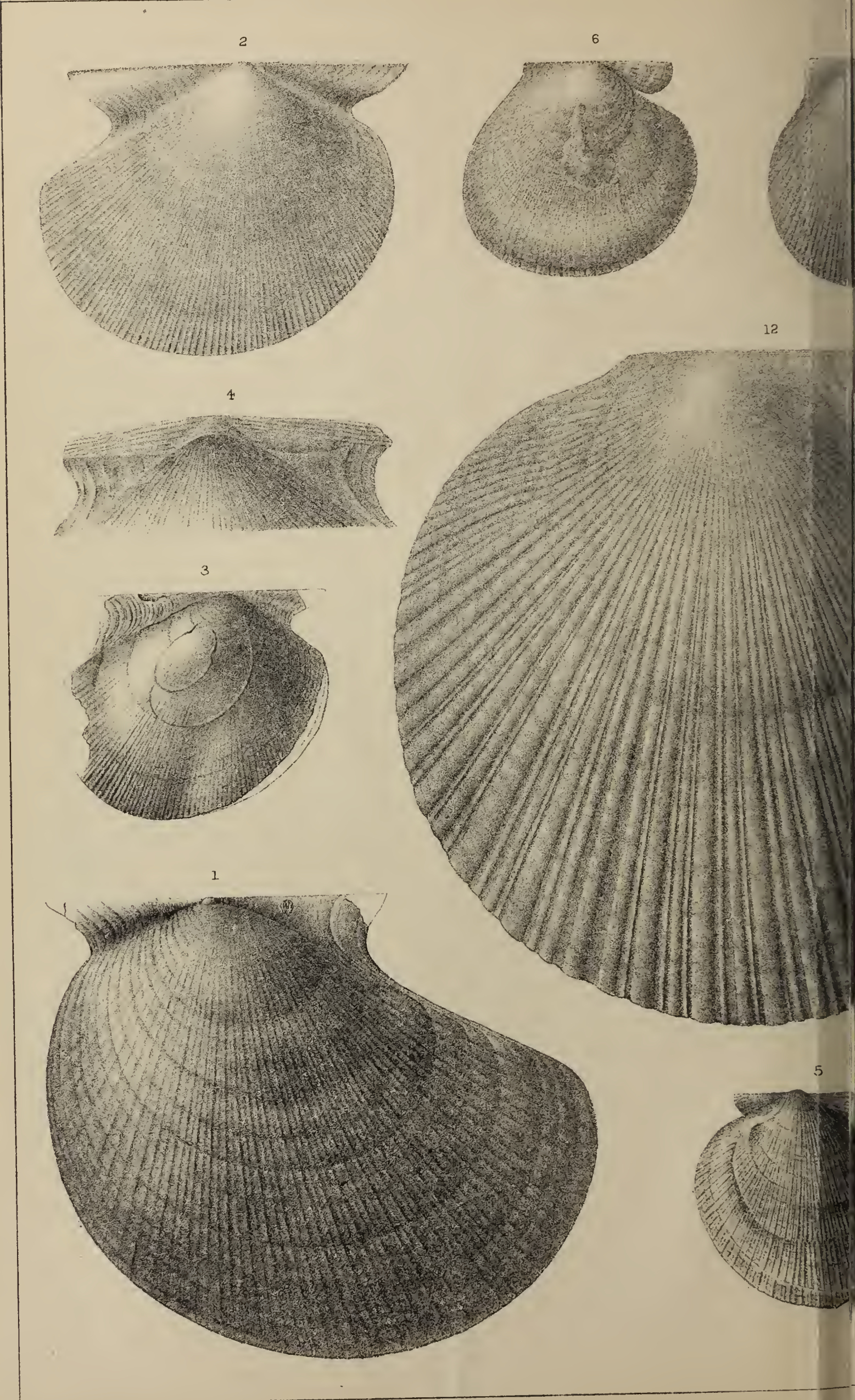
- Fig. 12. A large left valve as obtained from an impression of the matrix. Chemung group. *Montrose, Pa.*

LYRIOPECTEN INTERRADIATUS.

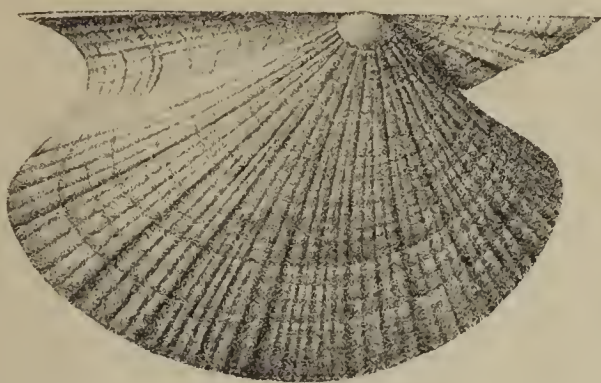
- Fig. 13. A small left valve. Hamilton group. *Fultonham, Schoharie Co., N. Y.*

LYRIOPECTEN CYMBALON.

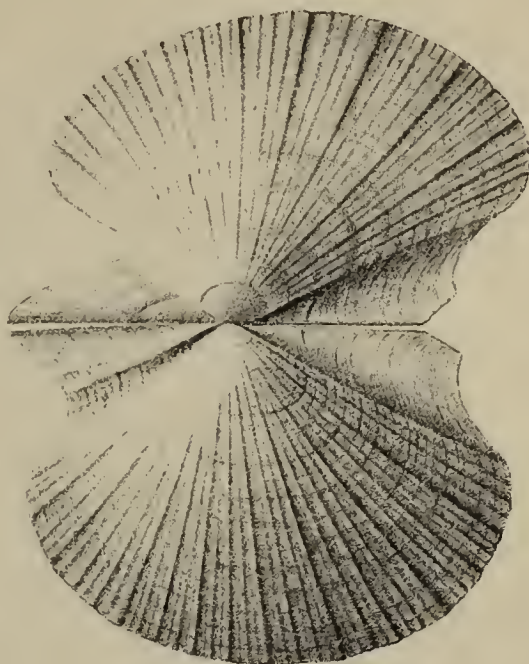
- Fig. 14. View of a large and perfect left valve. Hamilton group. *From a boulder near Elmira, N. Y.*



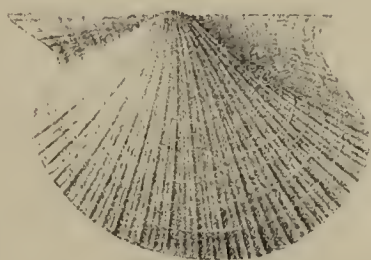
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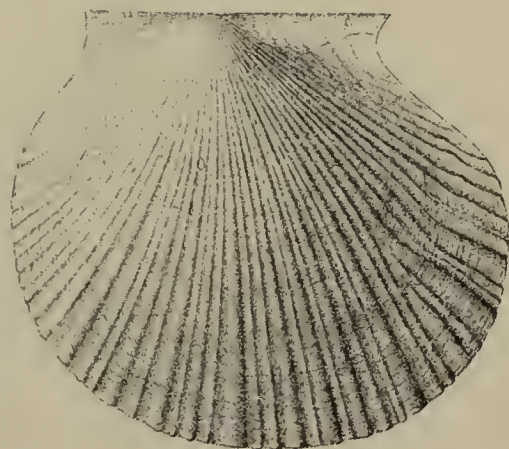
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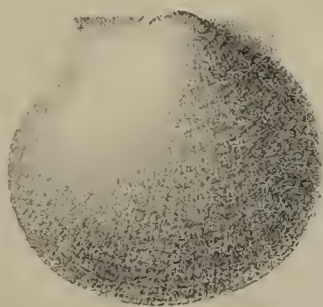
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PLATE III.

PTERINEA FLABELLA.

- Fig. 1. A left valve showing the general form and surface ornamentation. Hamilton group. *Pratt's Falls, Onondaga Co., N. Y.*
- Fig. 2. The internal mould of a left valve, showing the ligamental area, lateral and cardinal teeth, pallial line and both muscular impressions. Hamilton group. *Schoharie Co., N. Y.*
- Fig. 3. A cardinal view of a natural internal mould of a fragment of the left valve, showing the characters of the interior. Hamilton group. *Otsego Co., N. Y.*

PTERINEA CHEMUNGENSIS.

- Fig. 4. A left valve showing the general form of the shell. Chemung group. *Chemung Narrows, N. Y.*

LIMOPTERA MACROPTERA.

- Fig. 5. A left valve showing the general form and ornamentation of the shell and the striated ligamental area. Hamilton group. *Madison Co., N. Y.*
- Fig. 6. A small right valve preserving marked surface characters. Hamilton group. *Pratt's Falls, Onondaga Co., N. Y.*

LIMOPTERA CANCELLATA.

- Fig. 7. A cardinal view, showing the filling of the umbonal adductor muscular attachment, where the pallial line terminates. Hamilton group. *Falls of the Ohio.*

ECTENODESMA BIROSTRATUM.

See Plate IV, fig. 18.

- Fig. 8. A left valve showing the form and ornamentation of the shell. Chemung group. *Franklin, Delaware Co., N. Y.*

ACTINOPTERIA SUBDECUSSATA.

- Fig. 9. An individual of medium size showing the form and surface markings. Hamilton group. *Canandaigua lake, N. Y.*

ACTINOPTERIA BOYDI.

- Fig. 10. A left valve of this species.
- Fig. 11. A corresponding right valve showing the comparative form and surface ornamentation. Hamilton group. *Schoharie Co., N. Y.*

ACTINOPTERIA ETA.

- Fig. 12. A left valve of medium size, somewhat narrowed by pressure, but showing the cardinal expansions and surface markings.
- Fig. 13. A somewhat larger right valve. Chemung group. *Ithaca, N. Y.*

ACTINOPTERIA MURICATA.

- Fig. 14. A small left valve showing the extent of the wing, x 2. Marcellus shale. *Littleville, Livingston Co., N. Y.*

PLATE III— *Continued.*

PTYCHOPTERIA BEECHERI.

Fig. 15. An entire left valve showing its gibbous and arcuate form.

Fig. 16. A right valve showing the comparatively stronger alar fold and furrow of this valve. Chemung group. *Warren, Pa.*

PTYCHOPTERIA SALAMANCA.

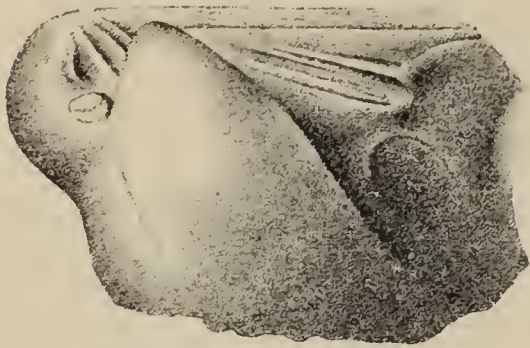
Fig. 17. A left valve showing the form of the shell.

Fig. 18. A cardinal view of the preceding, showing the relative convexity of the valves and the comparative elevation of the beaks. Chemung group. *Near Salamanca, N. Y.*

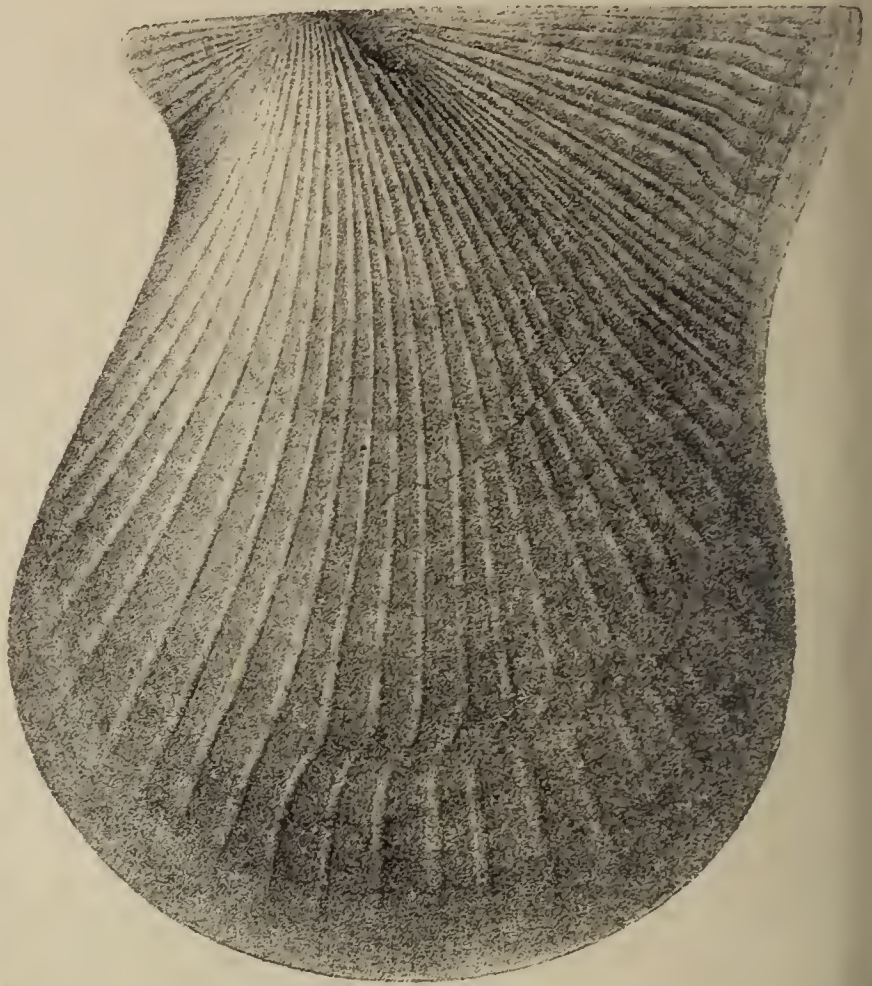
PTYCHOPTERIA PROTO

Fig. 19. A left valve of this species ; the alar furrow is very slight in this form. Chemung group *Near Smethport, Pa.*

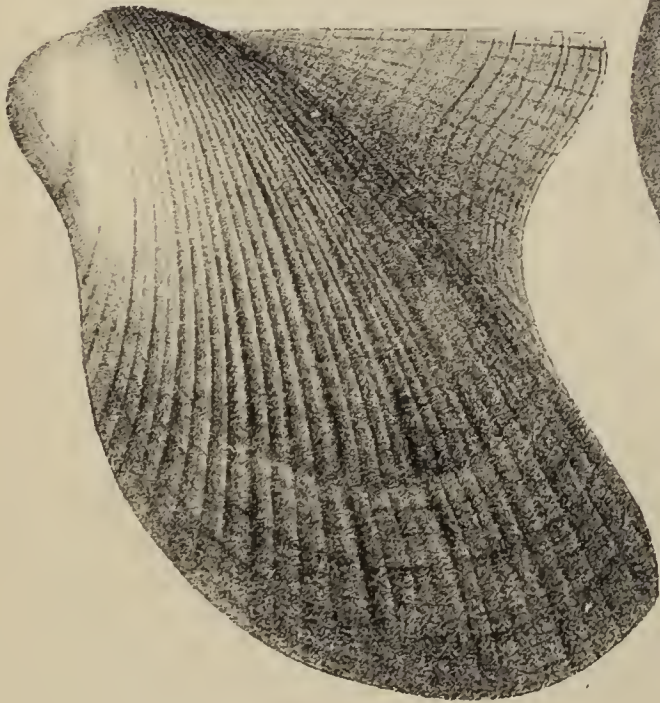
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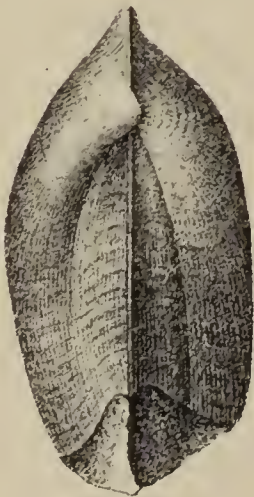
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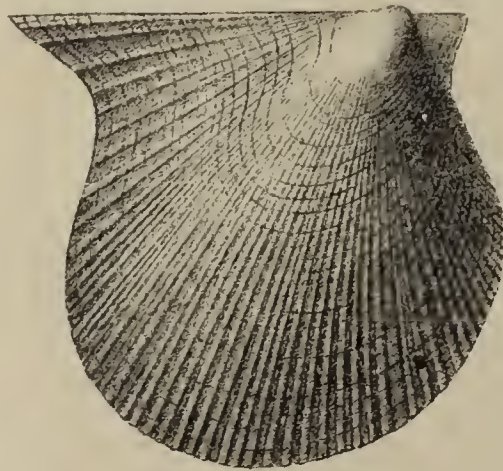
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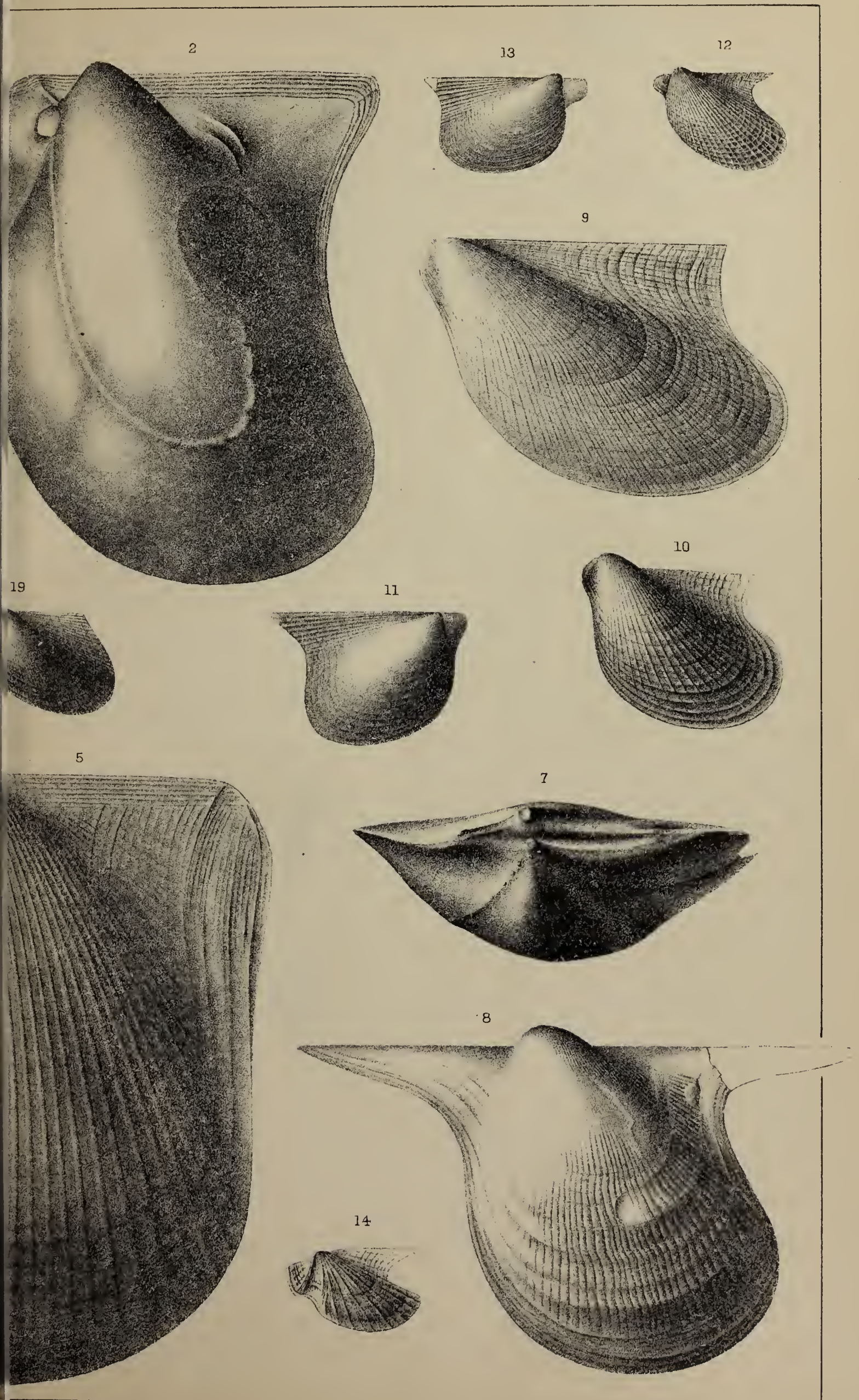


PLATE IV.

GLYPTODESMA ERECTUM.

- Fig. 1. A left valve of a small individual. Hamilton group *Fabius, Onondaga Co., N. Y.*
- Fig. 2. The right valve, as seen lying within the left, showing its form and comparative size. Hamilton group. *Cayuga lake, N. Y.*
- Fig. 3. A right valve having the cardinal angles much produced. Hamilton group. *Fultonham, Schoharie Co., N. Y.*
- Fig. 4. The anterior profile view of a very perfect specimen retaining the test, showing the comparative convexity of the valves. Hamilton group. *Pratt's Falls, Onondaga Co., N. Y.*
- Fig. 5. The interior of a specimen with the valves thrown open, showing the comparative size and form of the valves, the hinge characters and muscular markings. Hamilton group. *Delphi, Onondaga Co., N. Y.*
- Fig. 6. A view of the interior as obtained from a gutta-percha impression.
- Fig. 7. The internal mould of a left valve, showing the pallial line, muscular impression and small tubercles in the inter-pallial area, representing the points of attachment of small umbonal muscles. Hamilton group. *Pratt's Falls, Onondaga Co., N. Y.*
- Fig. 8. The hinge of a specimen, showing the striated ligamental area and strong cardinal folds. Hamilton group. *Delphi, Onondaga Co., N. Y.*

LEIOPTERIA RAFINESQUII.

- Fig. 9. A nearly entire left valve showing the form and the strong concentric undulations. Hamilton group. *Bellona, N. Y.*
- Fig. 10. A small left valve. Hamilton group. *Skaneateles lake, N. Y.*

LEIOPTERIA DEKAYI.

- Fig. 11. The internal mould of a specimen preserving both valves, and showing the vertical plate just anterior to the beaks. Hamilton group. *Fultonham, Schoharie Co., N. Y.*

LEPTODESMA LONGISPINUM.

- Fig. 12. A left valve showing the form of the body and extent of the spine. Chemung group. *Painted Post, N. Y.*

LEPTODESMA HECTOR.

- Figs. 13, 14. The left and right valves of this species; the right valve preserves the pallial line and muscular impression. Chemung group. *Canton, Bradford Co., Pa.*

LEPTODESMA FLACCIDUM.

- Fig. 15. A left valve showing the characteristic form of the species. Chemung group. *Lawrenceville, Tioga Co., Pa.*

LEPTODESMA PROPINQUUM.

- Fig. 16. A right valve showing the form and characters of the species. Chemung group. *Mansfield, Pa.*

PLATE IV — Continued.

PTERONITES PROFUNDUS.

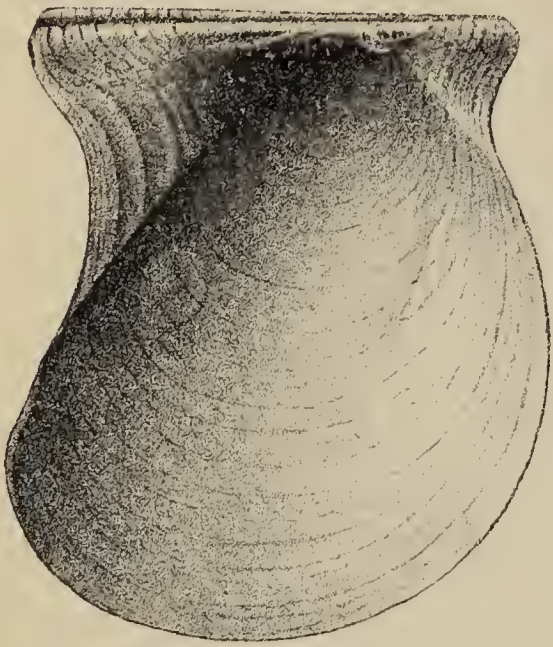
Fig. 17. An individual of medium size showing the form and proportion of the body. Chemung group. *Randolph, Cattaraugus Co., N. Y.*

ECTENODESMA BIROSTRATUM.

See Plate III, fig. 8.

Fig. 18. A right valve showing the form, surface ornamentation and strong, oblique lateral tooth. Chemung group. *Four miles north of Chenango Forks, N. Y.*

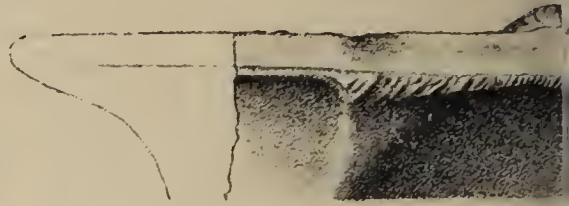
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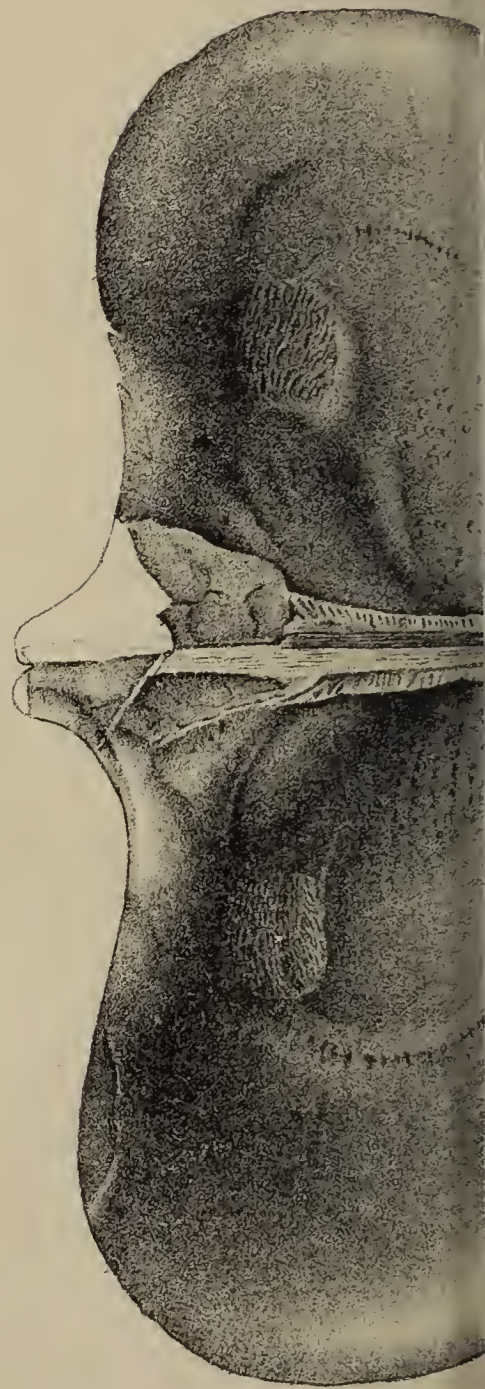
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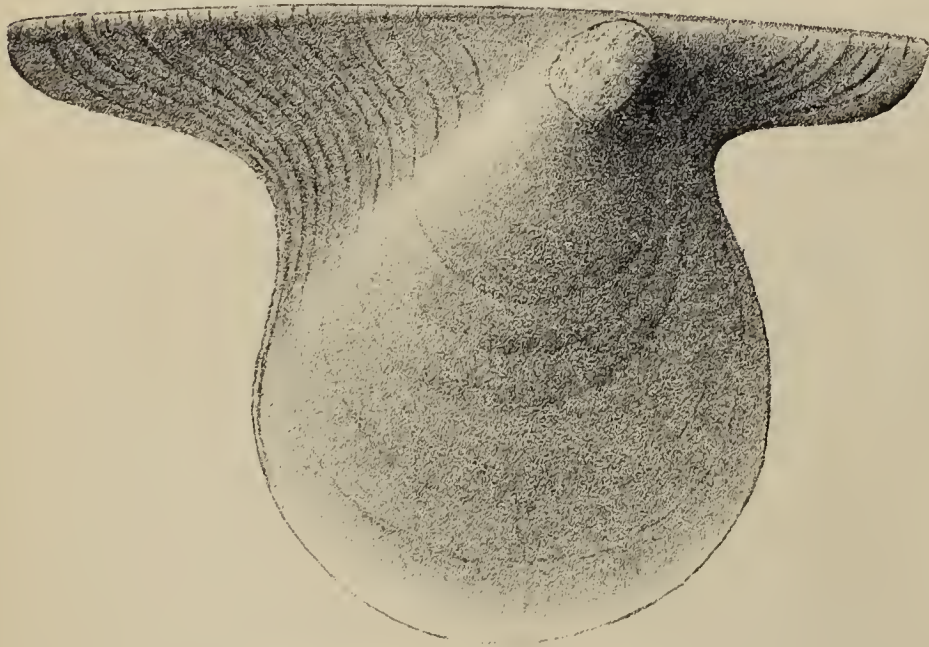
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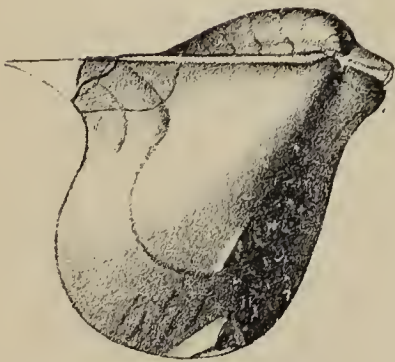
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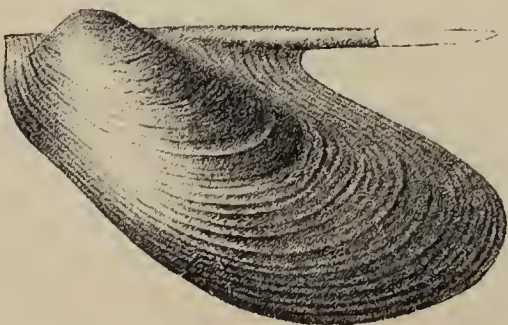
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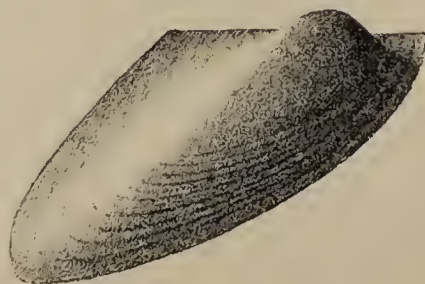
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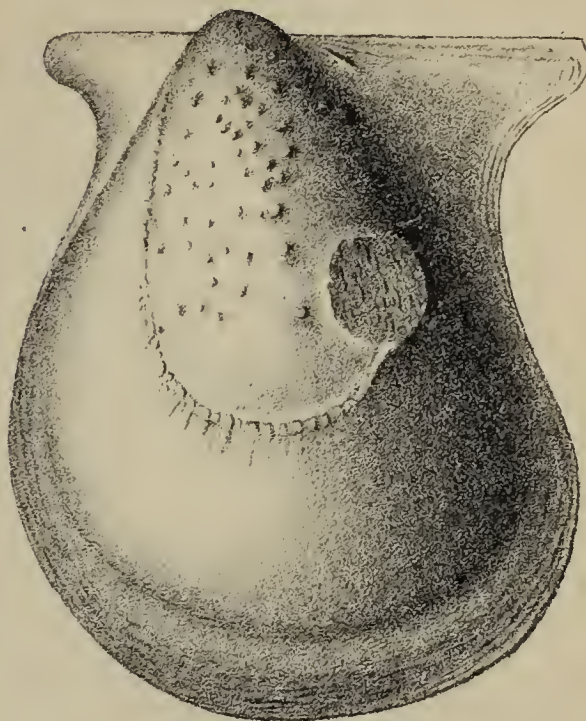
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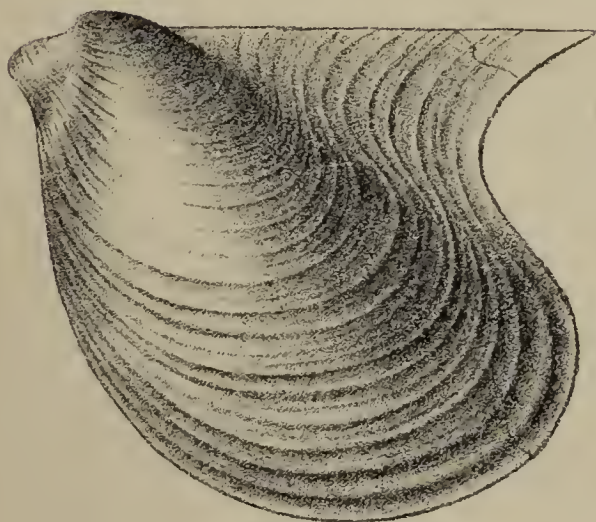
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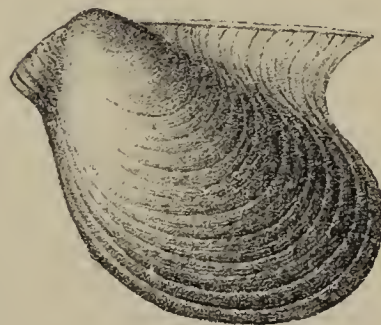
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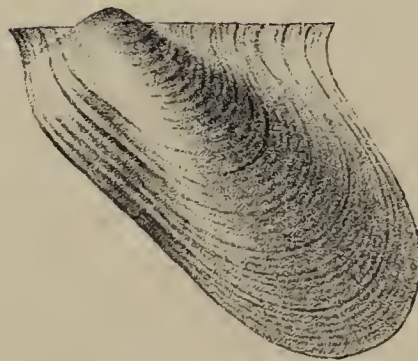
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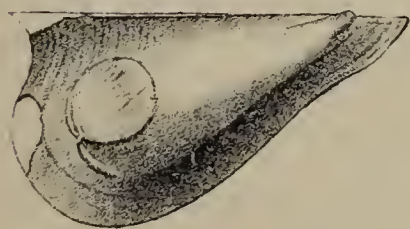
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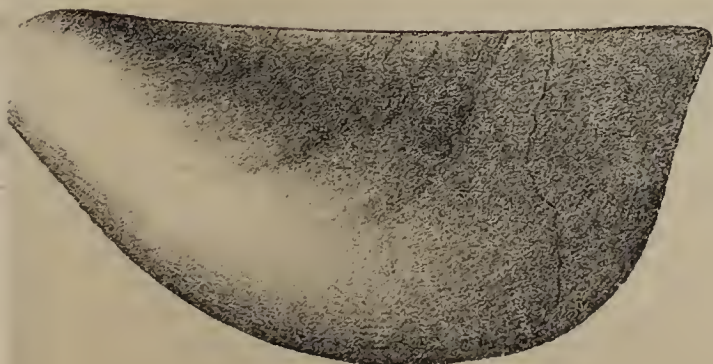
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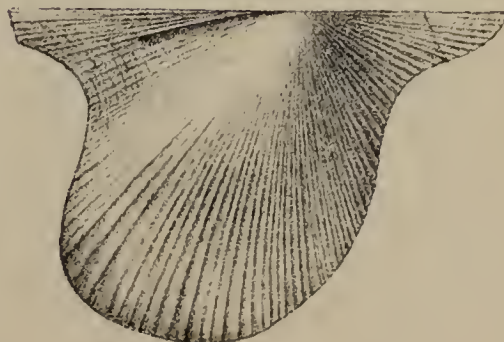


PLATE V.

MYTILARCA (PLETHOMYTILUS) PONDEROSA

- Fig. 1. A left valve of medium size. Upper Helderberg group. *Clarence Hollow, Erie Co., N. Y.*
- Fig. 2. The under side of the rostral portion of a specimen showing the great breadth of the striated ligamental area. The margin of the shell is compressed and bent inward on the anterior side, showing the surface striæ. Upper Helderberg group. *Columbus, Ohio.*

MYTILARCA LATA.

- Fig. 3. A right valve showing the broad form of the shell. Chemung group. *Randolph, N. Y.*

MYTILARCA (PLETHOMYTILUS) OVIFORMIS.

- Fig. 4. A right valve showing the strong ligamental area. Hamilton group. *Central N. Y.*

MYTILARCA CHEMUNGENSIS.

- Fig. 5. A left valve with the beak partially broken away, showing the small cardinal teeth. Chemung group. *Rockville, Allegany Co., N. Y.*
- Fig. 6. A small right valve showing the striated ligamental area. Chemung group. *Philipsburg, Allegany Co., N. Y.*

MYTILARCA CARINATA.

- Fig. 7. A right valve showing the form of the shell. Chemung group. *Near Elmira, N. Y.*
- Fig. 8. An enlargement of the cardinal portion of a specimen, showing the cardinal and lateral teeth and the ligamental area. Chemung group. *Near Elmira, N. Y.*

GOSSELETTIA TRIQUETRA.

- Fig. 9. The right side of a very ventricose specimen preserving the natural form.
- Fig. 10. A partial cast of a left valve. The beak has been removed to show the strong anterior teeth and anterior muscular impression. Hamilton group. *Fultonham, Schoharie Co., N. Y.*

MODIOLA (MYTILOPS) PRÆCEDENS.

- Fig. 11. The cardinal view of a specimen with both valves strongly striate. Chemung group. *Olean, N. Y.*
- Fig. 12. A left valve of medium size, preserving the surface striæ. Chemung group. *Near Olean, N. Y.*

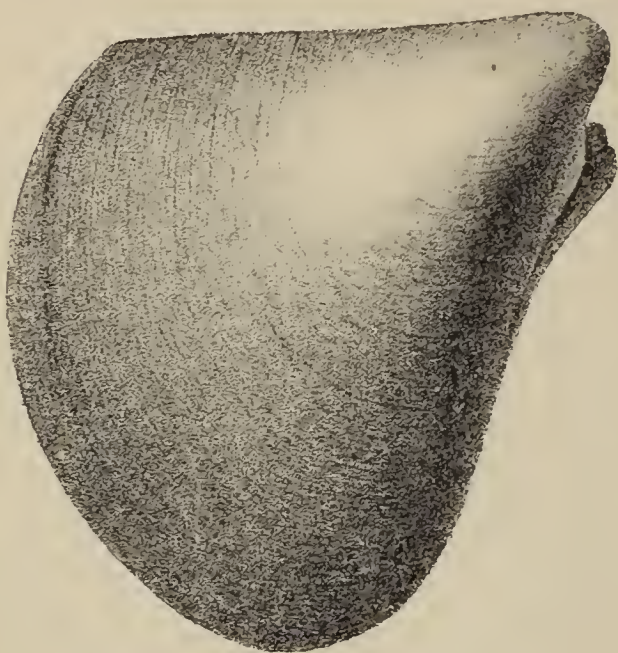
BYSSOPTERIA RADIATA.

- Fig. 13. An imperfect left valve which shows the general outline and the duplication of the radii. Chemung group. *Mansfield, Tioga Co., Pa.*

PALAEOPINNA FLABELLA.

- Fig. 14. The left valve described, showing the form of the shell and a single groove along the hinge. Oriskany sandstone. *Schoharie, N. Y.*

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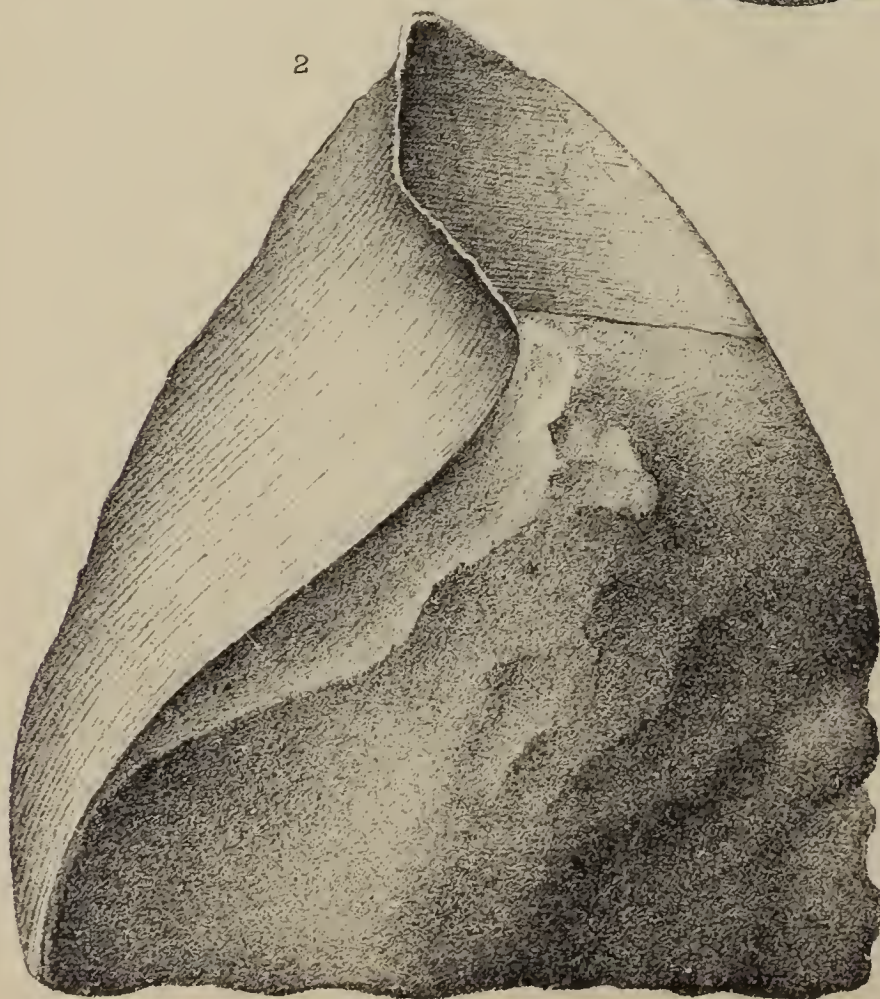
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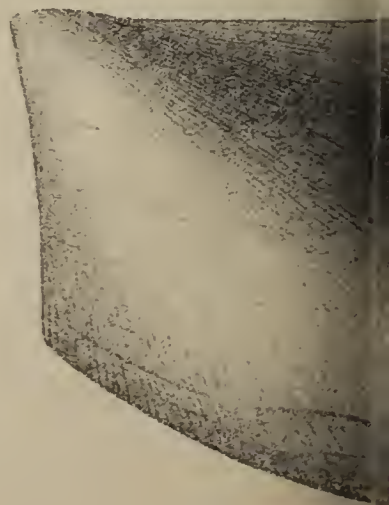
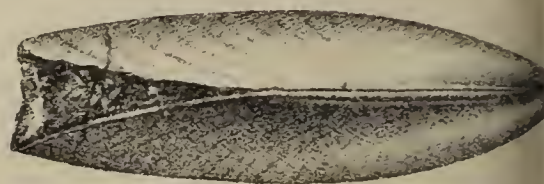
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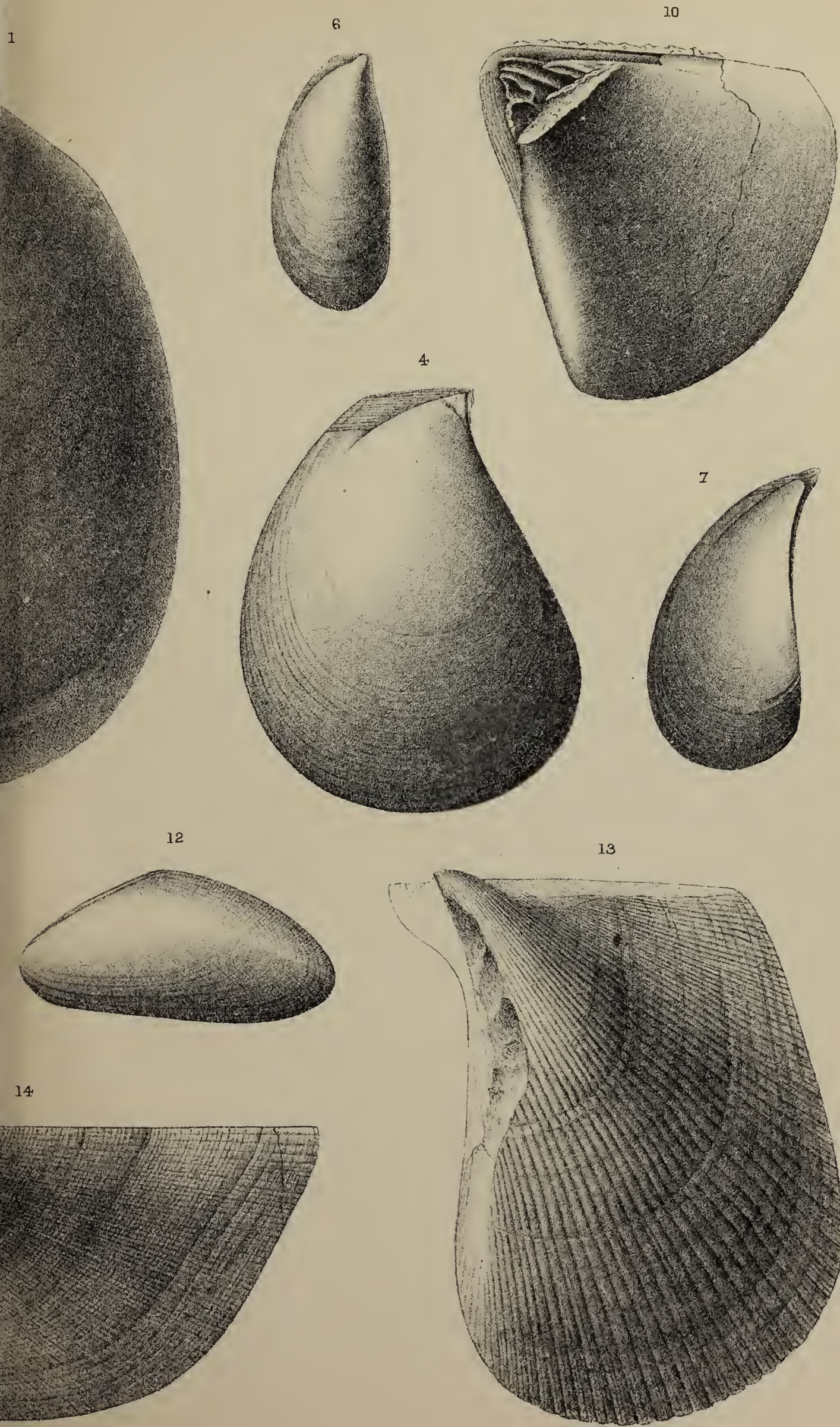


PLATE VI.

CYPRICARDELLA BELLISTRIATUS.

(=*Microdon*, *Microdonella*, *Eodon*.)

Fig. 1. A left valve, showing the general form of the shell. Hamilton group. *Skaneateles lake*, N. Y.

Fig. 2. An enlargement of the hinge of the preceding.

CYPRICARDELLA TENUISTRIATUS.

(=*Microdon*, *Microdonella*, *Eodon*.)

Fig. 3. A right valve preserving the anterior adductor muscular impression. Hamilton group. *Fultonham*, *Schoharie Co.*, N. Y.

MODIOMORPHA CONCENTRICA.

Fig. 4. A small right valve, showing strong concentric markings. Hamilton group. *Canandaigua lake*, N. Y.

Fig. 5. A left valve, showing the anterior muscular impression. Hamilton group. *Pratt's Falls*, *Onondaga Co.*, N. Y.

Fig. 6. A cardinal view of a specimen, preserving the ligament and showing the filling of the anterior muscular impressions.

Fig. 7. The interior of a left valve, as obtained from a gutta-percha impression, showing the muscular impression and cardinal tooth. Hamilton group. *Blenheim*, *Schoharie Co.*, N. Y.

MODIOMORPHA ALTA.

Fig. 8. A left valve. Hamilton group. *Pratt's Falls*, *Onondaga Co.*, N. Y.

MODIOMORPHA COMPLANATA.

Fig. 9. A right valve, showing the characters of the species. Hamilton group. *Shore of Cayuga lake*, N. Y.

MODIOMORPHA SUBALATA.

Fig. 10. A left valve, showing the form of the shell. Hamilton group. *Hamburgh*, *Erie Co.*, N. Y.

GONIOPHORA HAMILTONENSIS.

Fig. 11. A small right valve. Hamilton group. *Otsego Co.*, N. Y.

Fig. 12. A specimen of ordinary full size, preserving both valves, partially open and connected at the hinge, retaining the imprint of the ligament. Hamilton group. *Schoharie Co.*, N. Y.

Fig. 13. A cast of a large right valve, retaining the impression of the hinge-plate and showing the existence of a strong tooth beneath the beak. Hamilton group. *Fultonham*, *Schoharie Co.*, N. Y.

GONIOPHORA CHEMUNGENSIS.

Fig. 14. An entire left valve, showing the usual form of the shell. Chemung group.

PLATE VI—Continued.

GONIOPHORA TRUNCATA.

Fig. 15. An entire right valve, showing the striæ in great perfection. Hamilton group.

SANGUINOLITES CUNEATUS.

Fig. 16. A left valve. Hamilton group. Schoharie Co., N. Y.

Fig. 17. A right valve, preserving the radiating striæ to an unusual degree. Hamilton group. Schoharie Co., N. Y.

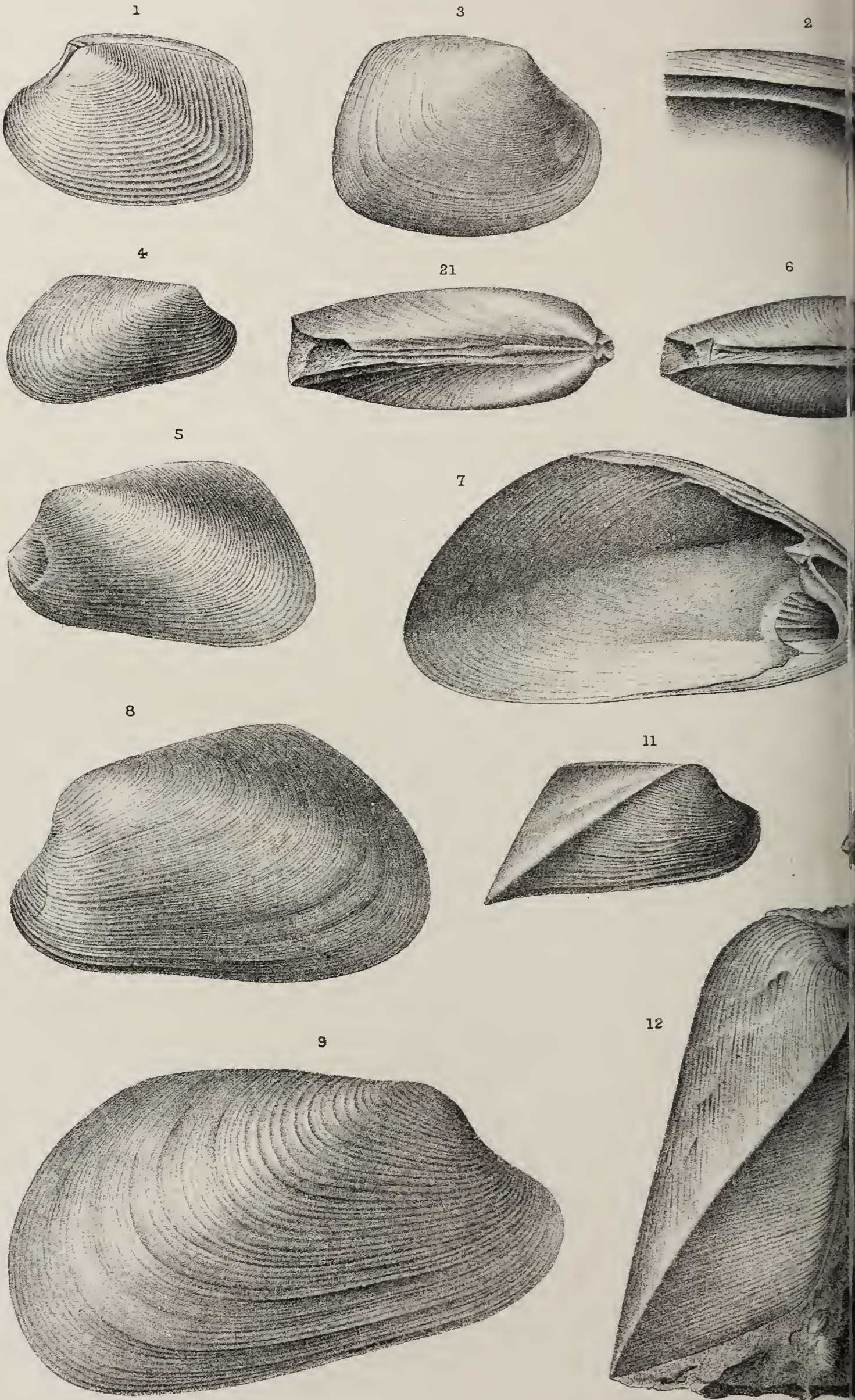
Fig. 18. A large individual, preserving both valves. Hamilton group. Schoharie Co., N. Y.

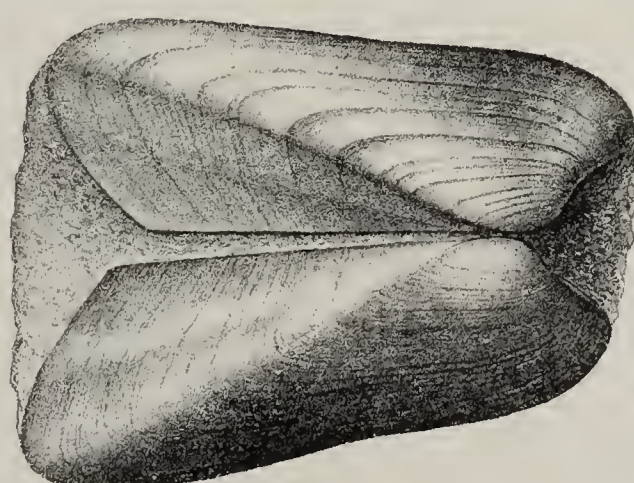
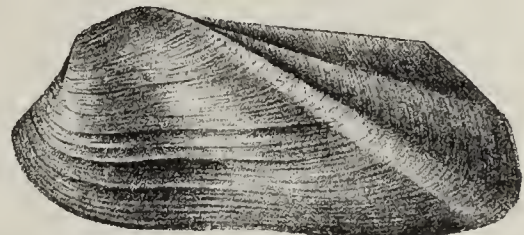
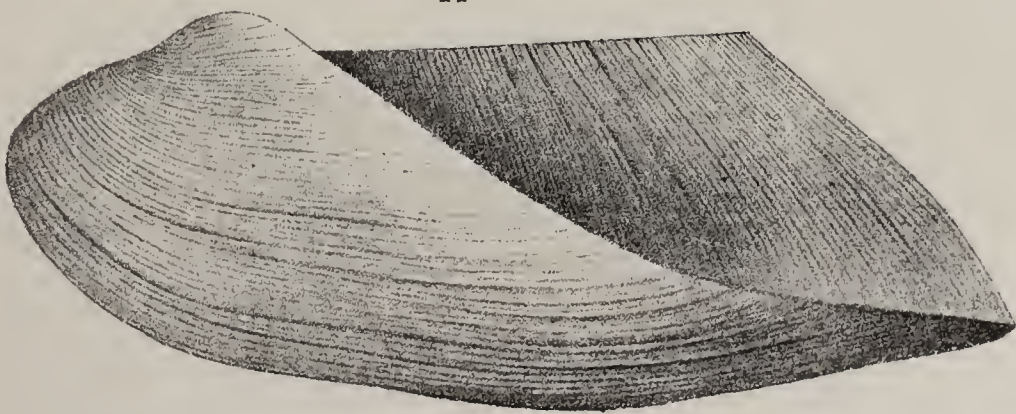
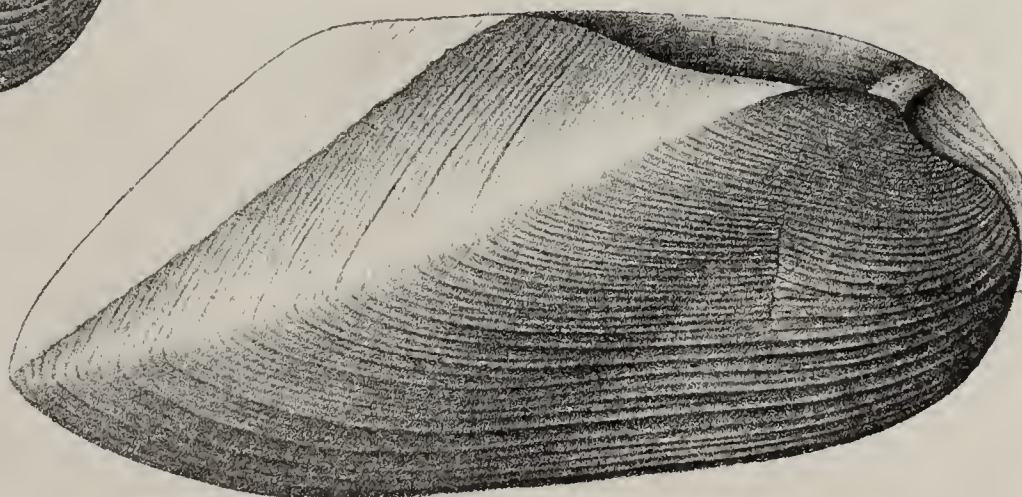
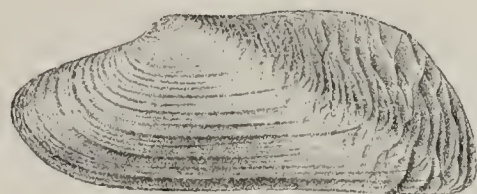
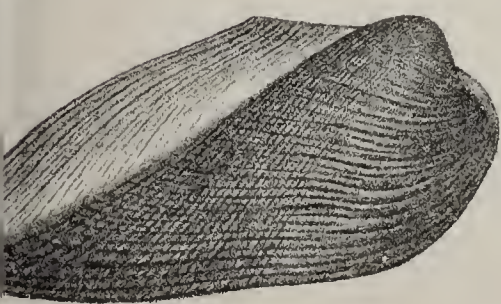
SANGUINOLITES SOLENOIDES.

Fig. 19. A small left valve, showing the form of the shell and the characteristic markings on the post-umbonal slope. Hamilton group. Canandaigua lake, N. Y.

SANGUINOLITES CLAVULUS.

Fig. 20. A right valve. Chemung group. Portville, Cattaraugus Co., N. Y.





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PLATE VII.

LEDA ROSTELLATA.

Fig. 1. A right valve, showing general form and hinge teeth, enlarged to two diameters. Hamilton group. *Cayuga lake, N. Y.*

Fig. 2. An enlargement to three diameters, to show the form of the shell and surface characters. Hamilton group. *Pratt's Falls, Onondaga Co., N. Y.*

LEDA OHIOENSIS.

Fig. 3. The interior of a right valve, as obtained from a gutta-percha impression of an internal cast, showing the characters of the hinge. Waverly sandstone. *Waverly, Ohio.*

NUCULA RANDALLI.

Fig. 4. A left valve of a very perfect specimen. Hamilton group. *Onondaga Co., N. Y.*

NUCULA LIRATA.

Fig. 5. A cardinal view of an internal mould, showing the impression of the anterior and posterior adductors, the anterior and posterior retractors, hinge-teeth and umbonal muscles, enlarged to two diameters. Hamilton group. *Patterson creek, Virginia.*

NUCULA VARICOSA.

Fig. 6. A characteristic left valve, enlarged to two diameters. Hamilton group. *Cayuga lake, N. Y.*

NUCULA LAMELLATA.

Fig. 7. A right valve, showing hinge characters and impressions of the teeth, enlarged to three diameters. Hamilton group. *Cayuga lake, N. Y.*

NUCULA IOWENSIS.

Fig. 8. The internal mould of a left valve, enlarged to three diameters. Waverly group. *Granville, Ohio.*

Fig. 9. The interior of the same, as obtained from a gutta-percha impression of the cast, natural size.

NUCULITES OBLONGATA.

Fig. 10. A cast of the right valve of a large specimen, showing the muscular impression, pallial line and hinge crenulations. Hamilton group. *Schoharie Co., N. Y.*

Fig. 11. The interior of a large left valve, from a gutta-percha impression, showing the internal characters very perfectly. The ridge bordering the anterior muscular imprint is unusually broad and thickened, and the pedal scars on the umbo distinctly marked. Hamilton group. *Virginia.*

Figs. 12, 13. The right side and cardinal view of an internal cast, showing the adductor and pedal muscular scars. Hamilton group. *Virginia.*

PLATE VII— Continued.

NUCULITES CUNEIFORMIS.

Fig. 14. The right valve, showing the ordinary form and proportions of the shell.

NUCULITES TRIQUETRA.

Fig. 15. A left valve, showing the usual specific characters. Hamilton group. *Aurora, Cayuga Co., N. Y.*

PALAEONEILO CONSTRICTA.

Fig. 16. A left valve, showing the impression of the hinge, enlarged to two diameters. Hamilton group. *Cayuga lake, N. Y.*

PALAEONEILO MAXIMA.

Fig. 17. A right valve, showing the form of the shell. Hamilton group. *Fultonham, Schoharie Co., N. Y.*

PALAEONEILO PLANA.

Fig. 18. The interior of a left valve, as obtained from a gutta-percha impression, showing the hinge teeth and muscular impressions. Hamilton group. *Otsego Co., N. Y.*

PALAEONEILO FECUNDA.

Fig. 19. An enlargement of the central portion of the hinge, to show the junction of the anterior and posterior ranges of teeth. Hamilton group. *Virginia.*

PALAEONEILO MUTA.

Fig. 20. A right valve. Hamilton group. *Eastern N. Y.*

PALAEONEILO BISULCATA.

Fig. 21. A left valve, enlarged to two diameters. Chemung group. *Elmira, N. Y.*

PALAEONEILO ATTENUATA.

Fig. 22. The interior of a left valve, as obtained from a gutta-percha impression, showing the muscular impression and hinge characters. Waverly group. *Ohio.*

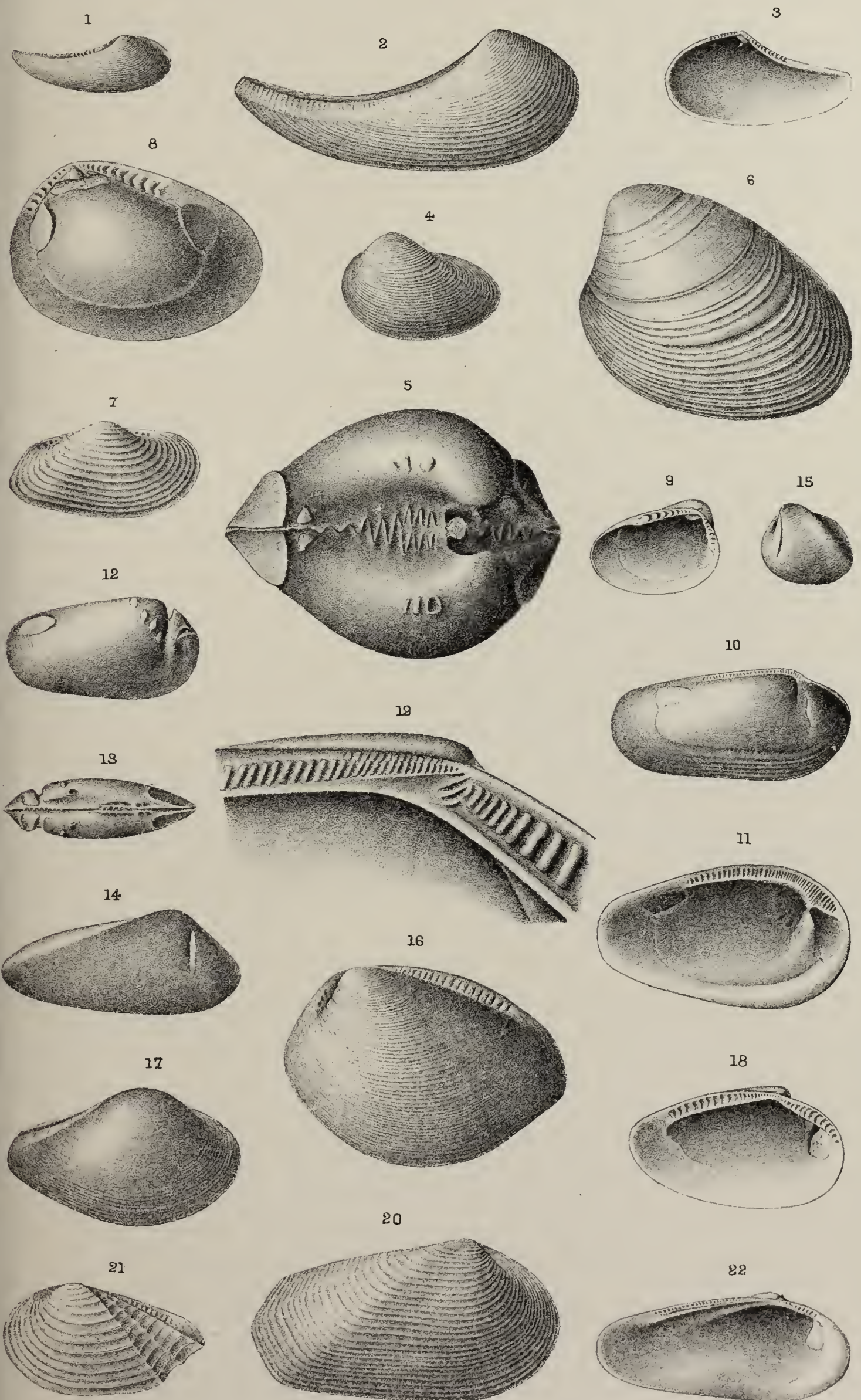


PLATE VIII.

PTYCHODESMA KNAPPIANUM.

- Fig. 1. The right side of a specimen, showing the general form and surface characters.
- Fig. 2. A cardinal view of the preceding, showing the deeply excavate and striated ligamental area.
- Fig. 3. An enlargement of the hinge-plate and cardinal area. Upper Helderberg group. *Louisville, Ky.*

MACRODON HAMILTONIÆ.

- Fig. 4. The internal mould of a right valve, showing some remains of the surface ornamentation and the lateral teeth. Hamilton group. *Seneca lake, N. Y.*

MACRODON CHEMUNGENSIS.

- Fig. 5. A left valve of the usual form. Chemung group. *Near Elmira, N. Y.*
- Fig. 6. A portion of a cast of a large individual, showing the features of the anterior hinge-plate, enlarged to two diameters. Chemung group. *Meadville, Pa.*

NYASSA ARGUTA.

- Fig. 7. A small left valve, showing the usual characters of the species. Hamilton group. *Madison Co., N. Y.*
- Fig. 8. The interior from a gutta-percha impression, showing the hinge characters. Hamilton group. *Otsego Co., N. Y.*

NYASSA SUBALATA.

- Fig. 9. A left valve, showing the muscular impression and the cardinal tooth. Hamilton group. *Schoharie Co., N. Y.*

DYSTACTELLA TELLINIFORMIS.

- Fig. 10. The right side of a large individual, restored at the anterior end from the line drawn across the figure. Upper Helderberg group. *Cayuga, Canada West.*

SCHIZODUS TUMIDUS.

- Fig. 11. The right side of a very perfect cast, showing the muscular impressions and pallial line. Upper Helderberg group. *Near Columbus, Ohio.*

SCHIZODUS NASUTUS.

- Fig. 12. A cardinal view of an internal cast, showing the markings left by the cardinal teeth. Hamilton group. *Hardy Co., Virginia.*

PLATE VIII—Continued.

SCHIZODUS CUNEUS.

Fig. 13. A right valve, showing the form and ornamentation of the shell, enlarged to two diameters. Hamilton group. *Cayuga lake, N. Y.*

SCHIZODUS CHEMUNGENSIS.

Fig. 14. A left valve of the usual form. Chemung group. *Ithaca, N. Y.*

LAMELLIBRANCHIATA.

Report State Geologist.1882.

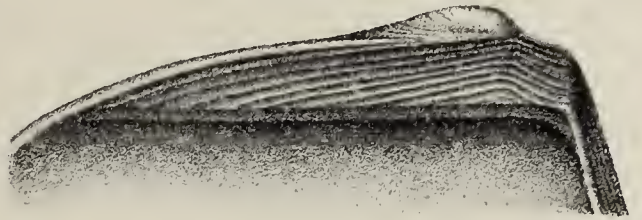
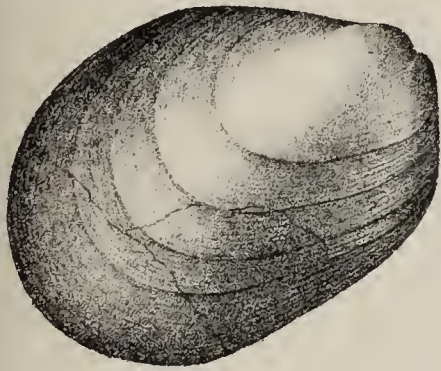
Generic Illustrations.

Plate VIII.

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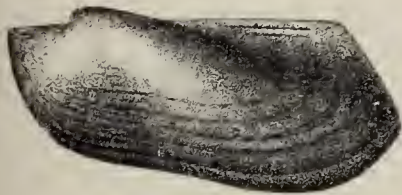
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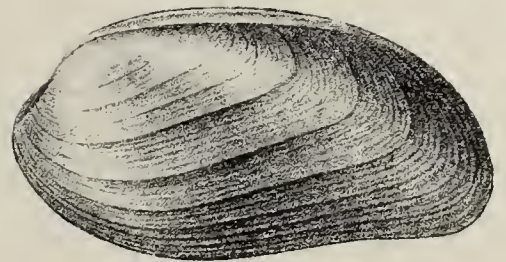


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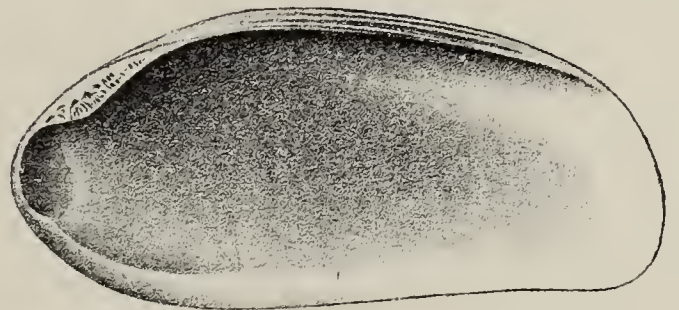
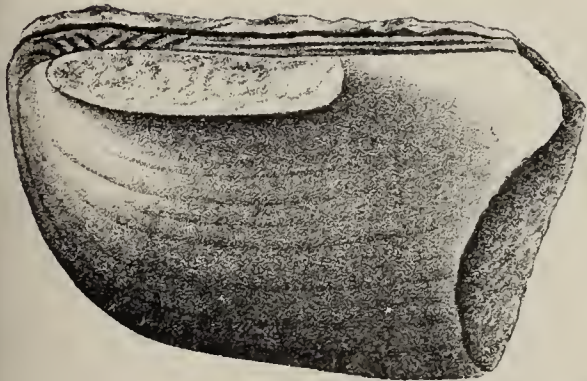


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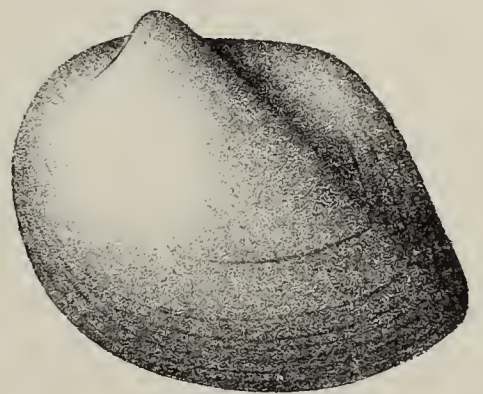
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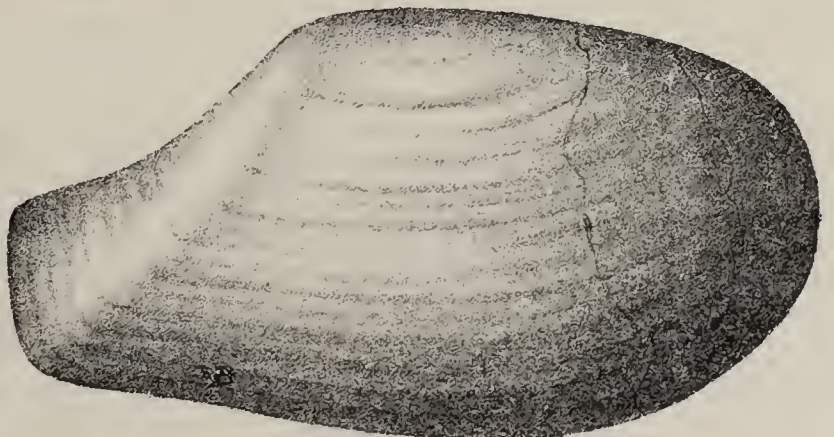


PLATE IX.

CONOCARDIUM NASUTUM.

Fig. 1. The right side of a specimen.

Fig. 2. A basal view of the preceding. Schoharie grit. *Schoharie, N. Y.*

CONOCARDIUM CUNEUS.

Fig. 3. A basal view, showing the anterior projecting fimbriate expansion. Schoharie grit. *Clarksville, Albany Co., N. Y.*

CONOCARDIUM TRIGONALE.

Fig. 4. A cardinal view of a small individual, showing a portion of the anterior fimbriate expansion; the tube has been broken away. Corniferous limestone. *Falls of the Ohio.*

Fig. 5. A cardinal view of an internal cast, showing anterior and posterior muscular impressions. Corniferous limestone. *Near Columbus, Ohio.*

CONOCARDIUM LIRATUM.

Fig. 6. A left valve, enlarged to three diameters. The specimen is probably somewhat distorted by compression. Chemung group. *Ithaca, N. Y.*

PARACYCLAS LIRATA.

Fig. 7. The left side of a specimen, showing well-preserved surface ornamentation. Hamilton group. *Near Louisville, Ky.*

PARACYCLAS TENUIS.

Fig. 8. A left valve of this species enlarged to three diameters. Hamilton group. *Skaneateles lake, N. Y.*

PARACYCLAS ELLIPTICA, var. OCCIDENTALIS.

Fig. 9. The right side of a very perfect specimen, showing the usual form and surface characters of the western variety. Hamilton group. *Clarke Co., Indiana.*

MEGAMBONIA SUBCORDIFORMIS.

Fig. 10. A very perfect left valve of ordinary size, preserving the shell, and showing the radiating striæ of the surface.

Fig. 11. The interior of a left valve from a gutta-percha impression, showing the lateral tooth and anterior muscular impression. The anterior teeth have not been seen on account of the imperfection of the specimens. Upper Helderberg group. *Clarence Hollow, Erie Co., N. Y.*

YOLDIA? VALVULA.

Figs. 12, 13, 14. The left, right and cardinal views of a well-preserved specimen. Hamilton group. *Near Louisville, Ky.*

AMNIGENIA CATSKILLENSIS.

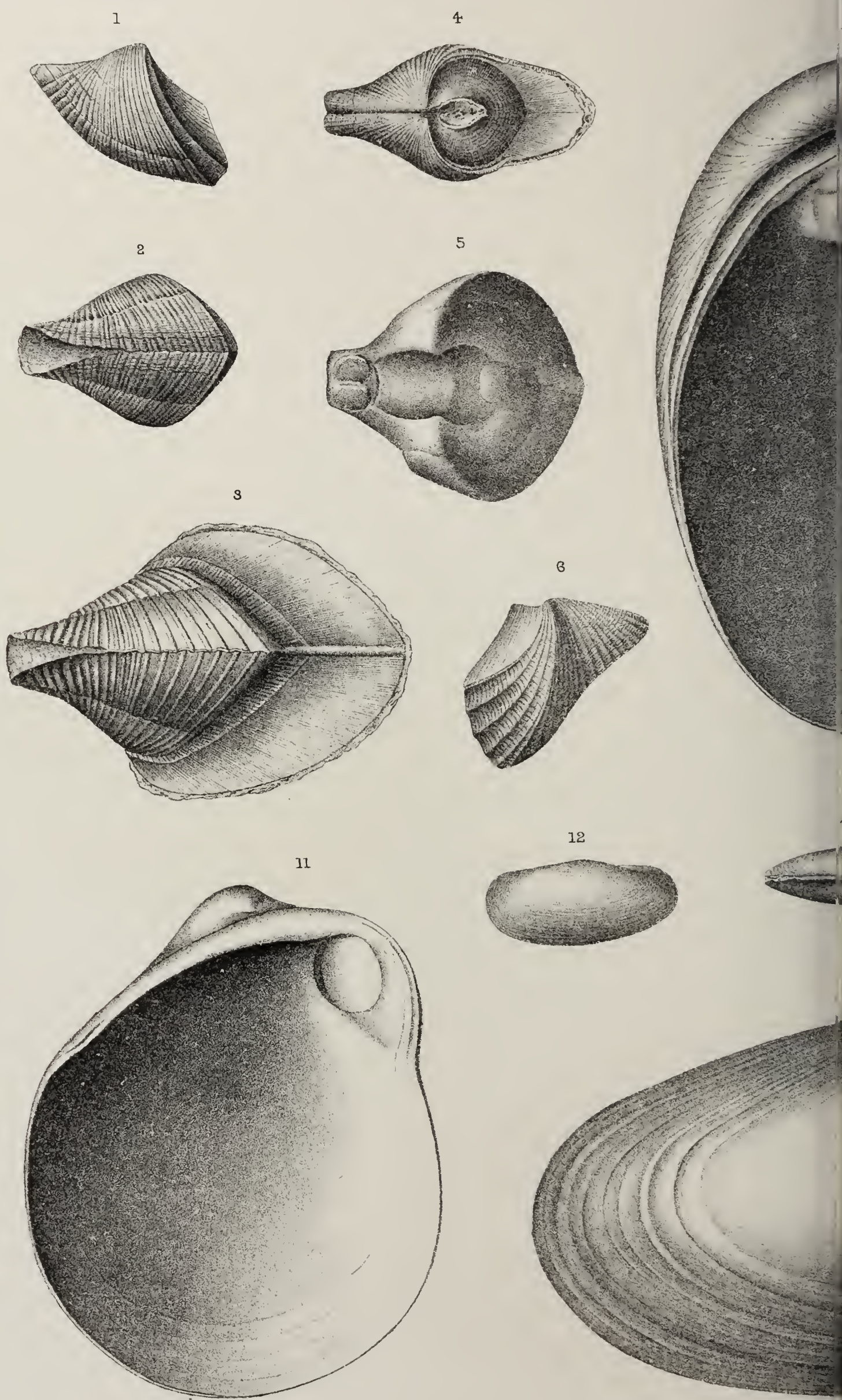
Fig. 15. A right valve apparently not compressed, showing the true form of the shell. Oneonta sandstone. The specimen is of unusually large size. This species occurs abundantly at Richmond's quarry, near Mount Upton, N. Y.

MEGALOMUS CANADENSIS.

Fig. 16. The interior of a left valve, introduced for comparison with Megam-bonia and Megalodon, with which these have been supposed to be generically identical. *Galt, Ontario.*

MEGALODON CUCULLATUS.

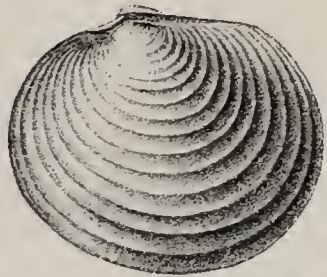
Fig. 17. An interior of a left valve, also introduced for comparison. *Paffrath, Germany.*



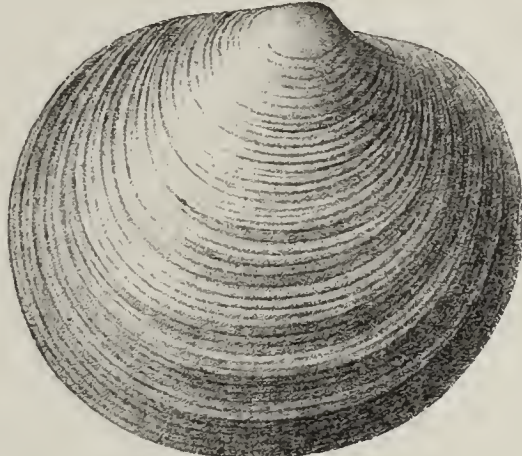
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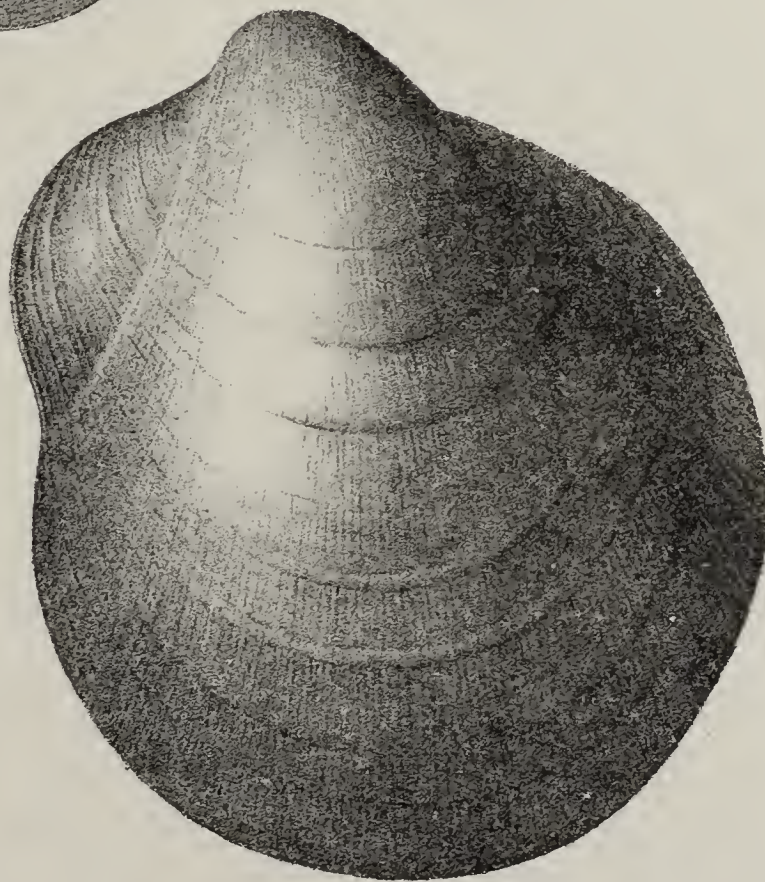
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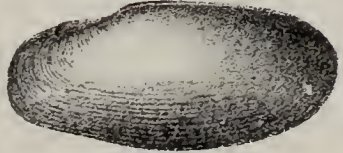
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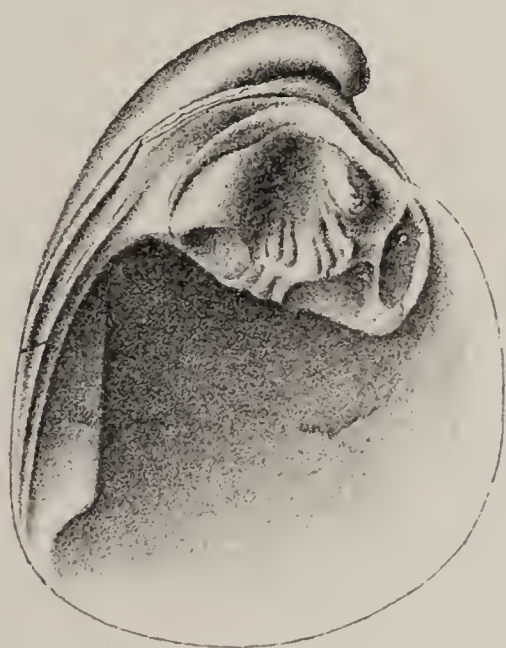


PLATE X.

LUNULICARDIUM CURTUM.

- Fig. 1. A right valve enlarged to two diameters, showing the form and surface ornamentation. Hamilton group. *Cayuga lake, N. Y.*

LUNULICARDIUM ORNATUM.

- Fig. 2. A large right valve. Chemung group. *Elmira, N. Y.*

LUNULICARDIUM FRAGILE.

- Fig. 3. A specimen retaining both valves enlarged to four diameters. Genesee slate. *Bristol Center, Ontario Co., N. Y.*

CARDIOLA ? ROBUSTA.

- Fig. 4. A large and entire left valve. Portage group. *Near Portage, N. Y.*

CARDIOLA ? LINCKLÆNI.

- Fig. 5. A large left valve, showing the alternating radii which become duplicate on the posterior end. Hamilton group. *Mission House, south of Buffalo, N. Y.*

CARDIOLA ? EQUILATERA.

- Fig. 6. A left valve of this species, showing the rounded radii. Marcellus shale. *Littleville, Livingston Co., N. Y.*

CARDIOLA ? SPECIOSA.

- Fig. 7. A specimen preserving both valves, slightly displaced at the hinge, enlarged to two diameters. Genesee slate. *Bristol Center, Ontario Co., N. Y.*

EDMONDIA PHILIPI.

- Fig. 8. A left valve, showing the form of the shell. Chemung group. *Philipsburg, Allegany Co., N. Y.*
Fig. 9. A smaller left valve of the ordinary form of this species. Chemung group. *Hobbierville, Allegany Co., N. Y.*

CARDIOMORPHA TEXTILIS.

- Fig. 10. A left valve, somewhat imperfect but preserving the surface markings. Portage group. *Portage, N. Y.*

CARDIOMORPHA CORDATUS.

- Fig. 11. The right side of a specimen, preserving both valves, partly open. Hamilton group. *Hamilton, N. Y.*
Fig. 12. The anterior view of a small specimen, showing the convexity of the valves. Hamilton group. *Leonardsville, Madison Co., N. Y.*

PLATE X — Continued.

GRAMMYSIA (SPHENOMYA) CUNEATA.

- Fig. 13. A large right valve, somewhat vertically compressed so as to narrow the postero-cardinal slope. Hamilton group. *New Berlin, Chenango Co., N. Y.*
- Fig. 14. A cardinal view of a small specimen. Hamilton group. *Onondaga Co., N. Y.*

GRAMMYSIA (LEPTODOMUS) CONSTRICTA.

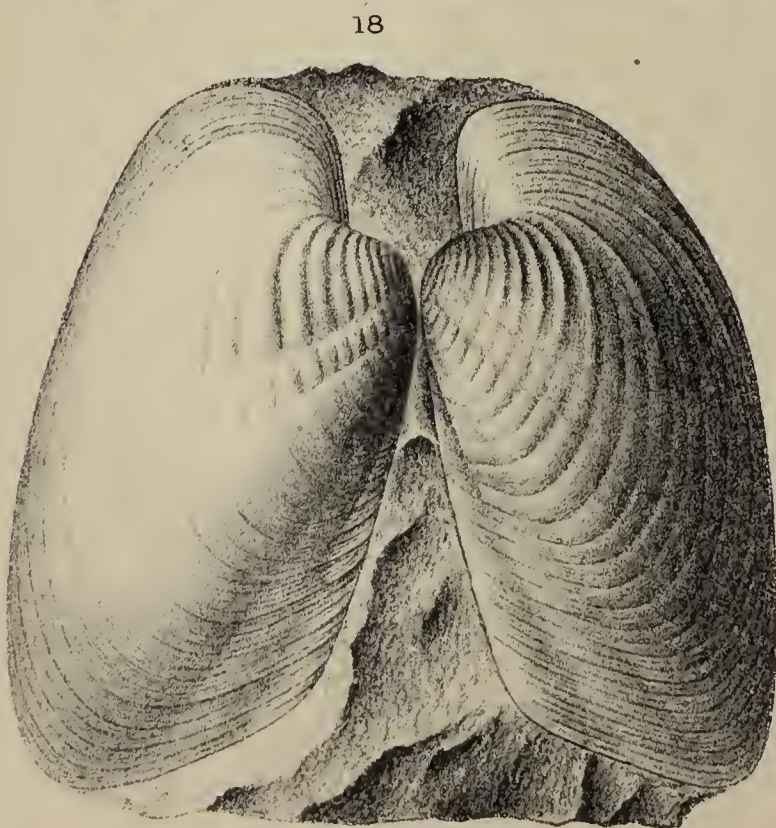
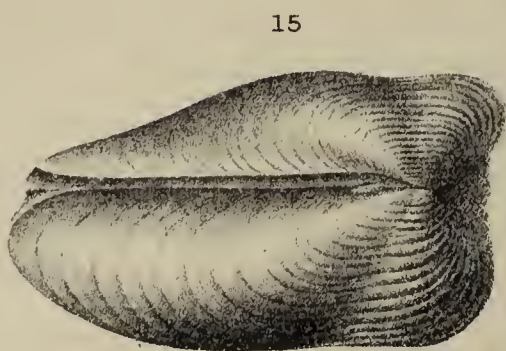
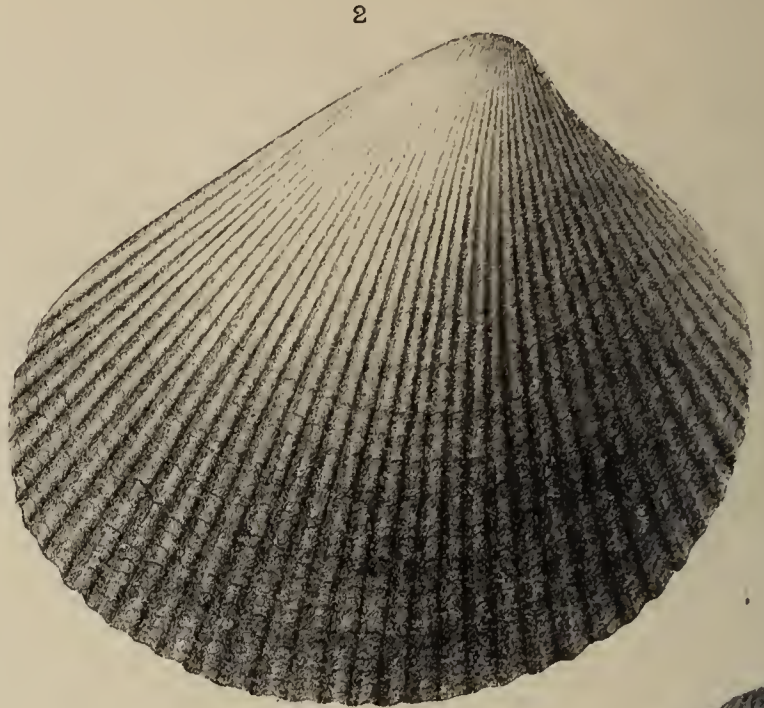
- Fig. 15. A cardinal view of a vertically flattened specimen, showing the incurving of the valves along the hinge-line forming the escutcheon. Hamilton group. *Canandaigua lake, N. Y.*
- Fig. 16. The right valve of a specimen somewhat flattened by compression. Hamilton group. *Fultonham, Schoharie Co., N. Y.*

GRAMMYSIA BISULCATA.

- Fig. 17. The right side of an internal mould, showing the posterior muscular impression and the pallial line. Hamilton group. *Central New York.*
- Fig. 18. A specimen showing both valves in position and the ligament connecting them. Hamilton group. *Schoharie Co., N. Y.*

GRAMMYSIA NODOCOSTATA.

- Figs. 19, 20. The left and cardinal views of a small, slightly compressed specimen, with the costæ of the mesial ridge strongly nodose. Fig. 19 shows the position and form of the ligament. Hamilton group. *Near Hamilton, Madison Co., N. Y.*



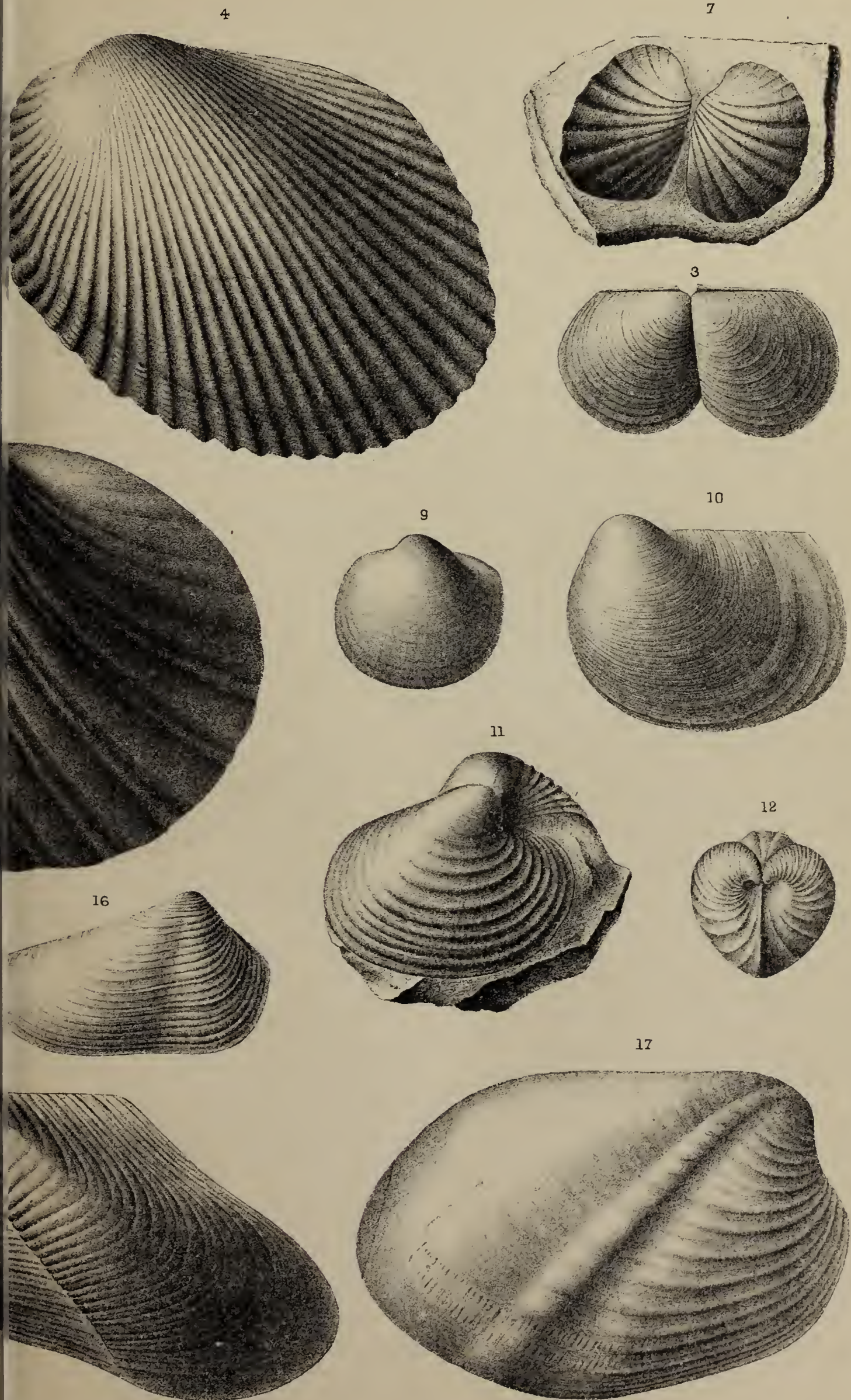


PLATE XI.

MODIELLA PYGMÆA.

- Fig. 1. A small left valve enlarged to two diameters. *Pratt's Falls, Onondaga Co., N. Y.*
Fig. 2. A larger right valve, showing the pallial line and muscular impressions. Hamilton group. *Skaneateles lake, N. Y.*

PALÆANATINA TYPÆ.

- Fig. 3. A left valve, showing the usual form of the shell. Chemung group. *Portville, Allegany Co., N. Y.*
Fig. 4. A large left valve partially restored at the extremities, in the figure. Chemung group. *Olean, N. Y.*

PALÆANATINA QUADRATA.

- Fig. 5. A large left valve, showing the quadrate form of the shell. Chemung group. *Erwin Centre, Steuben Co., N. Y.*

PROTHYRIS PLANULATA.

- Fig. 6. A view of a specimen preserving both valves which are partly open, enlarged to three diameters. Hamilton group. *Outlet of Crooked lake, N. Y.*

PROTHYRIS LANCEOLATA.

- Fig. 7. A specimen preserving both valves in contact, showing the form of the shell. Hamilton group. *Canandaigua lake, N. Y.*

TELLINOPSIS EMARGINATA.

- Fig. 8. A left valve of the ordinary form. Hamilton group. *Smyrna, Chenango Co., N. Y.*
Fig. 9. A smaller left valve, showing the surface markings.
Fig. 10. A larger specimen of somewhat different form. Hamilton group. *Borodino, Onondaga Co., N. Y.*

CYPRICARDINIA INDENTA.

- Fig. 11. A left valve enlarged to three diameters, showing the usual form of the shell. Hamilton group. *Canandaigua lake, N. Y.*
Fig. 12. A right valve retaining the shell and showing the surface markings, enlarged to three diameters. Hamilton group. *Lake Erie shore, N. Y.*

CYPRICARDINIA PLANULATA.

- Fig. 13. An internal cast of a right valve, showing muscular impressions and pallial line. Schoharie grit. *Schoharie, N. Y.*

PLATE XI—Continued.

ORTHONOTA PARVULA.

Fig. 14. A specimen retaining both valves, showing the general features of the species. Hamilton group. *Canandaigua lake, N. Y.*

ORTHONOTA CARINATA.

Fig. 15. An enlargement, to two diameters, of a specimen, showing the valves united along the hinge. Hamilton group. *Cayuga lake, N. Y.*

ORTHONOTA SILIQUOIDEA.

Fig. 16. The right valve of the only specimen observed. Hamilton group. *Schoharie Co., N. Y.*

ORTHONOTA UNDULATA.

Fig. 17. A specimen of medium size, showing the form of the shell and hinge structure externally, with the valves united quite to the posterior extremity. Hamilton group. *Bear's gulf, Schoharie Co., N. Y.*

PTHONIA NODOCOSTATA.

Fig. 18. A left valve, showing strong surface characters. Hamilton group. *Canandaigua lake, N. Y.*

PTHONIA SECTIFRONS.

Fig. 19. A left valve somewhat vertically compressed but preserving the surface characters. Hamilton group. *Madison Co., N. Y.*

PTHONIA CYLINDRICA.

Fig. 20. A right valve, preserving its natural proportions. Hamilton group. *Cayuga lake, N. Y.*

PHOLADELLA ORNATA.

Fig. 21. A large specimen of elongate form. Chemung group. *Ithaca, N. Y.*

PHOLADELLA NEWBERRYI.

Fig. 22. A nearly perfect left valve showing the general form of the shell and character of the surface. Waverly sandstone. *Licking Co., Ohio.*

CIMITARIA RECURVA.

Fig. 23. A right valve, showing the usual form and surface characters of the shell. Hamilton group. *Delphi, Onondaga Co., N. Y.*

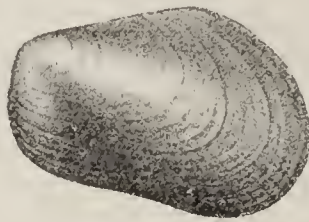
CIMITARIA CORRUGATA.

Fig. 24. A very large individual, showing the entire form of the shell. Hamilton group. *Canandaigua lake, N. Y.*

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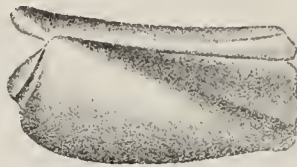
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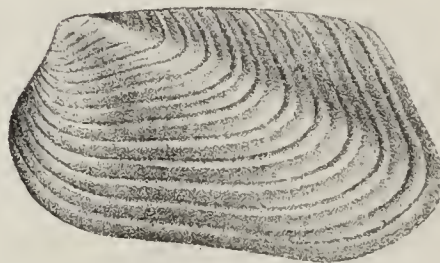
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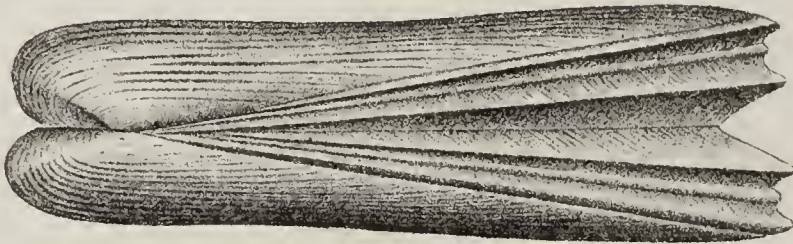
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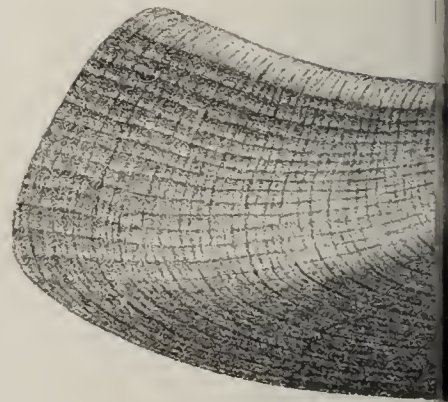
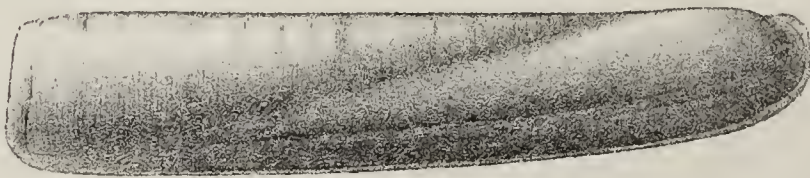
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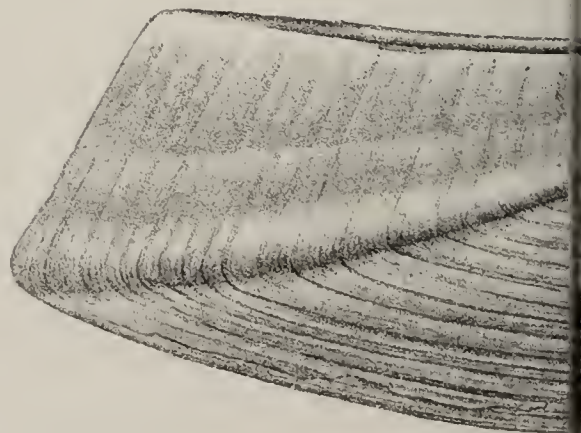
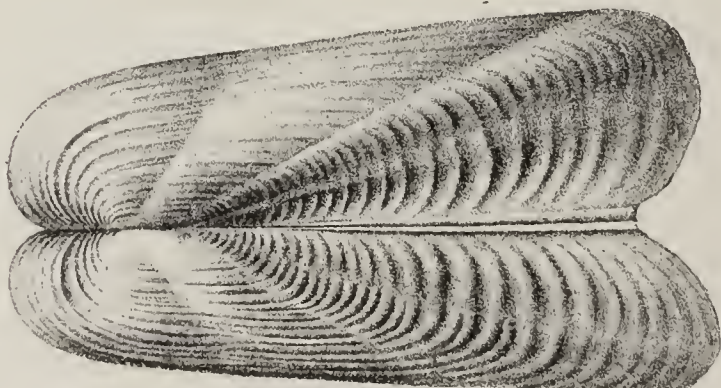
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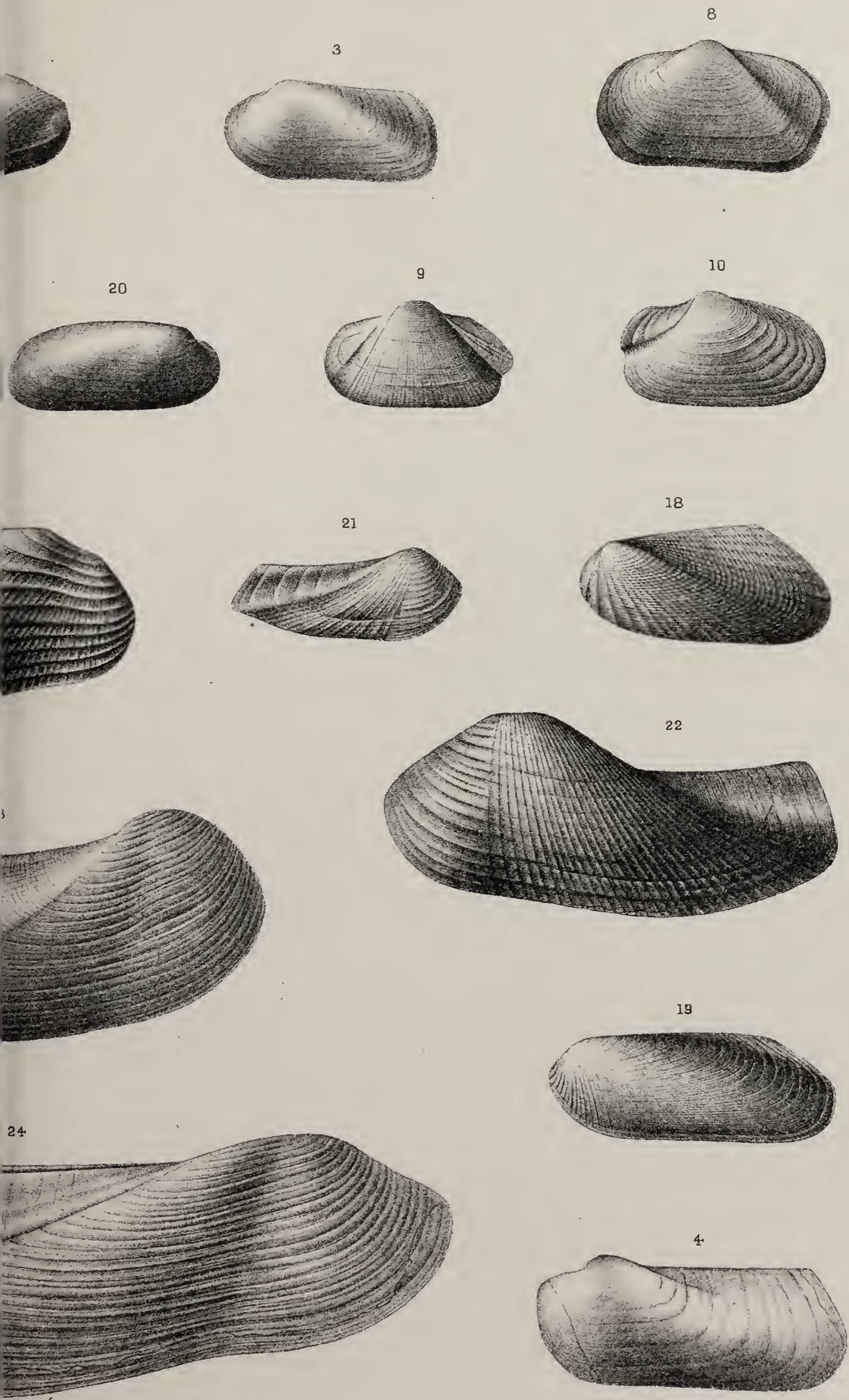


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